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Second Five-Year Review Report
Northwest Pipe and Casing
Clackamas, OR

Prepared for

U.S. Environmental Protection Agency
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Second Five-Year Review Report

For

Northwest Pipe and Casing

ORD 980988307

Clackamas, Oregon

September 2011

Prepared by:

US EPA Region 10

Environmental Cleanup Office

Approved by: Date:

9/21/2011

Daniel D. Opalski

Director, Environmental Cleanup Office

US EPA Region 10

CITATION

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Clackamas, OR. Prepared by Parametrix, Portland,
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EXECUTIVE SUMMARY

This report presents the findings of the second Five-Year Review performed for the Northwest Pipe and Casing /Hall Process Company (NWPC) Superfund site (Site) located in Clackamas County, Oregon. The Five-Year Review was conducted in accordance with the Comprehensive Five-Year Review Guidance, U.S. Environmental Protection Agency, June 2001. The purpose of the review is to determine whether human health and the environment are being protected through the implementation of the remedy for the Site.

The NWPC Site is located between SE Lawnfield and SE Mather Roads in Clackamas County, Oregon, approximately 20 miles southeast of Portland. The Site covers approximately 53 acres of land and was divided into two parcels (Parcels A and B) for the purposes of Site management. A pipe manufacturing and storage operation (Northwest Pipe and Casing) operated at Parcel A from 1973 to 1985. The eastern lot of Parcel A is owned by Northwest Development Corporation (NWDC) and contains three commercial use buildings. The western lot of Parcel A is owned by the Oregon Department of Transportation (ODOT). A pipe-coating business (Hall Process Company) operated at Parcel B from 1956 to 1978. Northwest Pipe and Casing leased the Hall property between 1978 and 1986, during which Northwest Pipe and Casing operated the pipe-coating facilities. Contaminants released at the Site into the soil and groundwater include volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs). Northwest Pipe and Casing Company, Wayne Hall, NWDC and ODOT each entered into Consent Decrees with EPA and the State of Oregon to address their liability under CERCLA for contamination at the Site. Parcel A is still owned by ODOT and NWDC, respectively, while Parcel B is now owned by Clackamas Development Agency and partly leased to Oregon Iron Works.

The Site is underlain by an upper water bearing zone (WBZ) that overlies a silt confining layer above the Troutdale Aquifer. The upper WBZ extends to about 90 feet below the ground surface (bgs) and consists of three hydrogeologic zones (shallow, intermediate, and deep). The silt confining layer serves as a hydraulic barrier between the upper WBZ and the Troutdale Aquifer.

The Site was divided into two operable units (OUs) to address soil (OU1) and groundwater contamination (OU2). The remedy for OU1 addressed the bulk of the soil contamination that was found on Parcel B during the remedial investigation (RI); the remedy for OU2 addressed the four groundwater plumes that were found to extend beneath Parcels A and B during the RI.

OPERABLE UNIT 1

The remedial action objectives (RAOs) for OU1 called for preventing direct human contact with on-site contaminated soils and preventing migration of soil contaminants to the groundwater that would result in an excess lifetime cancer risk of one in one million or a Hazard Quotient of 1. The remedy for OU1 included:

- Treatment, removal and/or disposal of 32,310 tons of highly contaminated soil from Parcel B that exceeded Oregon Hot Spot limits.
- Placement of a 2-foot-thick clean soil cap over less contaminated soil at Parcel B.
- Construction of a wetland to compensate for wetland losses from cap construction.
- Development and implementation of a long-term monitoring, inspection and maintenance program for the soil cap. Placement of institutional controls (ICs) such as restrictive land use covenants.

- Other measures, including perimeter fencing and warning signs (while the Site was vacant).

In 2004 an Explanation of Significant Differences (ESD) was issued for OU1 which included a revised (lower) cleanup level for vinyl chloride, the construction of a wetland to account for wetland areas which were impacted by soil cap construction and the inclusion of wetland Applicable or Relevant and Appropriate Requirements (ARARs).

The findings of the Second Five-Year Review indicate that the OU1 remedy is functioning as intended. The remedy has been fully implemented and meets the RAOs. The follow-up action identified is:

- Continue sitewide groundwater monitoring to ensure concentrations of chlorinated solvents are not increasing in the vicinity of known or potential source areas.

OPERABLE UNIT 2

The RAOs for OU2 called for preventing direct human contact with on-site contaminated groundwater and preventing migration of contaminated groundwater to deeper aquifers and off-site areas that would result in an excess lifetime cancer risk of one in one million or a Hazard Quotient of 1. The primary contaminants of concern (COCs) in the groundwater are tetrachloroethene (PCE), TCE, and vinyl chloride (VC). The remedy for OU2 has included:

- Installing and operating 12 in-situ air stripping wells (groundwater circulation wells, or GCWs) in the highest COCs concentration areas of the upper aquifer Plumes 1 through 4. The wells are connected to five equipment sheds that each house a blower, vapor extraction equipment, and activated carbon canisters for treatment.
- Installing groundwater monitoring wells in the vicinity of the treatment wells to evaluate their effectiveness over time for reducing contaminant concentrations in groundwater.
- Installing and operating 3 in-situ air stripping wells and an equipment shed in the vicinity of Lawnfield Road to prevent off-site migration of contaminated groundwater. The wells are to remove contaminants from groundwater before it moves off site.
- Using natural processes outside of the source areas to reduce contaminant concentrations in groundwater.
- Conducting annual sampling of groundwater monitoring wells to evaluate the progress toward attaining the groundwater remedial goals.
- Placing and enforcing institutional controls (ICs) on Parcel A and on Parcel B to ensure access for treatment systems operation and monitoring and to restrict future beneficial use of groundwater until cleanup levels are met.

Performance monitoring led to the determination that the GCWs were not functioning as intended and were not effective in removing contaminant mass or hydraulically containing impacted water from migrating (GeoTrans 2007). Eight GCWs were shut down in November 2006 and the remaining seven were shutdown in May 2007.

In 2008 an ESD was issued for OU2 which required the introduction of ICs for the NWDC owned portion of parcel A as concentrations of COCs in soil on this portion of the parcel had exceeded cleanup standards. The ICs were put in place through an EES between DEQ and NWDC.

As a result of additional site investigation in 2008 it was determined that significant soil contamination (manifested as dense non-aqueous phase liquid (DNAPL)) remained on parcel B. EPA determined that the residual source of DNAPL in subsurface soils was a chronic source of dissolved hazardous substances to groundwater and that no further effective action could be taken on the groundwater remedy until the residual source of DNAPL was removed. EPA requested assistance from the Removal Program in May 2009 to remove the source of soil contamination so that a modified groundwater remedy could be implemented. Approximately 24,798 tons of contaminated soil was excavated and disposed of off-site and approximately 551,000 gallons of contaminated groundwater were treated on-site. The excavation was backfilled with sand, gravel and soil amendment intended to create conditions encouraging dechlorination. COC concentrations in the vicinity of the TCRA have been significantly reduced and dechlorination parameters indicated that the desired effects on subsurface conditions have been achieved and continue to contribute to dechlorination of COCs.

The findings of the Second Five-Year Review indicate that the OU2 remedy is not functioning as intended. The follow-up action identified is:

- The GCW component of the remedy was not functioning as intended and has been discontinued. It is not yet known whether the additional removal and soil amendments will adequately accelerate attenuation of remaining contaminants in soil and in groundwater so as to achieve OU2 RAOs in a reasonable timeframe. Continued groundwater monitoring is necessary to ensure protectiveness in the long term.

PROTECTIVENESS STATEMENTS:

OU1

The remedy for OU1 currently protects human health and the environment and exposure pathways that could result in unacceptable risks are being controlled, however in order to ensure the remedy remains protective for the long term, sitewide groundwater monitoring needs to continue and results need to be evaluated to ensure concentrations of chlorinated solvents are not increasing in the vicinity of known or potential source areas.

OU2

The remedy for OU2 currently protects human health and the environment because groundwater exposure pathways are currently incomplete and ICs are in place to restrict beneficial use and prevent consumption of contaminated groundwater on Parcels A and B. However, in order for the groundwater remedy to remain protective in the long term, these follow-up actions identified in Section 9 need to be performed:

- Complete supplemental Risk Assessment and Feasibility Study to determine what changes need to be made to the selected remedy to address to achieve RAOs for OU2; and
- Modify the selected remedy accordingly and then implement as necessary.

SITEWIDE

The Site is currently protective of human health and the environment in the short term because of the ICs and actions that have been implemented at this Site. However, in order for the Site to be protective for the long term, sitewide groundwater monitoring should continue to ensure concentrations of chlorinated solvents are not increasing and a Feasibility Study and a decision document should be completed in support of modifying the remedy to address RAOs for OU2.

The Superfund Sitewide Human Exposure Environmental Indicator Status for the Site remains "Current Human Exposures Controlled". The site is capped, no one is using contaminated groundwater, and Institutional Controls are in place to ensure no unacceptable exposures occur. To ensure this indicator remains "Under Control" for the long term, the followup actions recommended in this review need to be completed.

The Groundwater Migration Environmental Indicator Status for the Site remains "Not Under Control" because no active remedy is in place for groundwater and PCE and TCE has been detected in off-site wells at or near the remediation goals for the Site. In order to bring groundwater under control, the followup actions recommended in this review need to be completed.

Cross Program Revitalization Measure Status: The Site remains "Protective for People Under Current Conditions".

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name (*from WasteLAN*): Northwest Pipe and Casing / Hall Process Company Superfund Site		
EPA ID (*from WasteLAN*):ORD 980988307		
Region 10	**State:** Oregon	**County:** Clackamas
NPL status: ☒ Final ☐ Deleted ☐ Other (specify)		
Remediation status (choose all that apply): ☐ Under Construction ☒ Operating ☐ Complete		
Multiple OUs?* ☒ Yes ☐ No	**Construction completion date:** 6/04/2004	
Has site been put into reuse? ☒ Yes ☐ No		
REVIEW STATUS		
Lead agency: ☒ EPA ☐ State ☐ Tribe ☐ Other Federal Agency		
Author name: Mark Ader		
Author title: Remedial Project Manager	**Author affiliation:** USEPA, Region 10	
Review period: January 1, 2011 to May 30, 2011		
Date(s) of site inspection: March 24, 2011		
Type of review ☒ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☐ Non-NPL Remedial Action Site ☐NPL State/Tribe-lead ☐ Regional Discretion		
Review number: ☐ 1 (first) ☒ 2 (second) ☐ 3 (third) ☐ Other (specify)		
Triggering action: ☐ Actual RA On-site Construction at OU #1 ☐ Actual RA Start at OU # ☐ Construction Completion Report ☒ Previous Five-Year Review ☐ Other (specify)		
Triggering action date (*from WasteLAN*): September 22, 2006		
Due date (*five years after triggering action date*): September 22, 2011		

* ["OU" refers to operable unit.]

Five-Year Review Summary Form, cont'd.

Issues / Recommendations and Follow Up Actions:

OU1

Issue	Recommendations and Follow-Up Action	Affects Protectiveness Current/Future	Responsible Party	Milestone Date
Residual contamination documented during the TCRA may exist on Parcel B, contributing to continuing leaching of chlorinated solvents to groundwater.	Continue sitewide groundwater monitoring to ensure concentrations of chlorinated solvents are not increasing in the vicinity of known or potential source areas.	N/Y	EPA	November 2011

OU2

Issue	Recommendations and Follow-Up Action	Affects Protectiveness Current/Future	Responsible Party	Milestone Date
The GCW component of the remedy was not functioning as intended and has been discontinued, and it is not yet known whether the additional removal and soil amendments will adequately accelerate attenuation of remaining contaminants in soil and in groundwater so as to achieve groundwater RAOs in a reasonable timeframe.	Potentially complete a supplemental Risk Assessment and Feasibility Study to determine what changes need to be made to the selected remedy to achieve RAOs for OU2	N/Y	EPA	November 30, 2012
The GCW component of the remedy was not functioning as intended and has been discontinued, and it is not yet known whether the additional removal and soil amendments will adequately accelerate attenuation of remaining contaminants in soil and in groundwater so as to achieve groundwater RAOs in a reasonable timeframe.	An ESD or ROD amendment should be completed to address RAOs for OU2.	N/Y	EPA	December 2013

Protectiveness Statements(s):

OU1

The remedy for OU1 currently protects human health and the environment and exposure pathways that could result in unacceptable risks are being controlled, however in order to ensure the remedy remains protective for the long term, sitewide groundwater monitoring needs to continue and results need to be evaluated to ensure concentrations of chlorinated solvents are not increasing in the vicinity of known or potential source areas.

OU2

The remedy for OU2 currently protects human health and the environment because groundwater exposure pathways are currently incomplete and ICs are in place to restrict beneficial use and prevent consumption of contaminated groundwater on Parcels A and B. However, in order for the groundwater remedy to remain protective in the long term, these follow-up actions identified in Section 9 need to be

performed:

- Complete supplemental Risk Assessment and Feasibility Study to determine what changes need to be made to the selected remedy to address to achieve RAOs for OU2; and
- Modify the selected remedy accordingly and then implement as necessary.

Sitewide

The Site is currently protective of human health and the environment in the short term because of the ICs and actions that have been implemented at this Site. However, in order for the Site to be protective for the long term, sitewide groundwater monitoring should continue to ensure concentrations of chlorinated solvents are not increasing and a Feasibility Study and a decision document should be completed in support of modifying the remedy to address RAOs for OU2.

Other Comments:

None

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

LIST OF FIGURES

TABLE OF CONTENTS (CONTINUED)

LIST OF TABLES

APPENDICES

ACRONYMS

AOC	Area of Contamination
ARAR	Applicable or Relevant and Appropriate Requirement
AST	Aboveground Storage Tank
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	Below Ground Surface
BTEX	Benzene Toluene Ethylene Xylene
CCDA	Clackamas County Development Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CMT	Continuous Multi-Tubing Well
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
CSM	Conceptual Site Model
CVOC	Chlorinated Volatile Organic Compound
DCE	Dichloroethene
DEQ	Oregon Department of Environmental Quality
DNAPL	Dense Non-aqueous Phase Liquid
EA	Excavation Area
EC	Excavation Criteria
E&E	Ecology and Environment
ERR	Emergency Response and Removal
EES	Easement & Equitable Servitude
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FEIS	Final Environmental Impact Statement
FFI	Focused Field Investigation
FS	Feasibility Study
ft/ft	Feet per Foot
GCW	Groundwater Circulation Well
gpm	Gallons per Minute
HPC	Hall Process Company
IC	Institutional Control
LTRA	Long Term Response Action
MCL	Maximum Contaminant Level

ACRONYMS (CONTINUED)

MPE	Measuring Point Elevations
NCP	National Oil and Hazardous Substances Contingency Plan
NGVD	National Geodetic Vertical Datum of 1988
NAPL	Non-aqueous-phase Liquid
NPL	Superfund National Priority List
NWDC	Northwest Development Company
NWPC	Northwest Pipe and Casing/Hall Process Company Superfund Site
ODOT	Oregon Department of Transportation
OECR	Oregon Environmental Cleanup Rules
OIW	Oregon Iron Works
O&M	Operation & Maintenance
OU	Operable Unit
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objective
RBDM	Risk Based Decision Making
RCRA	Resource Conservation and Recovery Act of 1976
RG	Remedial Goals
RI	Remedial Investigation
ROD	Record of Decision
RPM	EPA Remedial Project Manager
RSE	Remedial System Evaluation
TCE	Trichloroethene
TCRA	Time Critical Removal Action
TSCA	Toxic Substances Control Act of 1976
UST	Underground Storage Tank
VC	Vinyl Chloride
VOC	Volatile Organic Compound
WBZ	Water Bearing Zone

1. INTRODUCTION

The United States Environmental Protection Agency (EPA) Region 10 prepared this Five Year Review of completed and ongoing remedial actions (RAs) at the Northwest Pipe and Casing/Hall Process Company Superfund Site (Site) in Clackamas, Oregon. EPA, as lead agency for the Site, conducted this review. As EPA's contractor for the site, Parametrix provided analysis for and drafted the Five-Year Review. The Oregon Department of Environmental Quality (ODEQ) provided review. This is a "statutory" review and is the second Five Year Review for the Site, covering the period of August 2006 through July 2011. This Five Year Review was conducted pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121 and the National Oil and Hazardous Substances Contingency Plan (NCP). CERCLA §121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106] of the NCP, the President shall take or require such action. The President shall report to Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The EPA interpreted this requirement further in the NCP; 40 Code of Federal Regulations (CFR) §300.430(f)(4)(ii) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

For the purpose of conducting RAs at the Site, two Operable Units (OUs) were designated (EPA 2000; EPA 2001):

- Operable Unit 1 (OU1); Soils

  OU1 includes Parcel B structures and features, including subsurface piping, underground storage tanks (USTs), aboveground storage tanks (ASTs), soil piles, drums of investigation-derived waste, and contaminated soil.

- Operable Unit 2 (OU2); Groundwater

  OU2 includes all impacted groundwater with contamination originating on site.

This Review addresses and provides a protectiveness determination for each of the Operable Units.

The triggering action for this review was the completion of the first Five-Year Review for the Site in September 2006. The Five-Year Review is required due to the presence of contaminants that remain at the Site above levels that allow for unlimited land use and unrestricted exposure. It is the purpose of this Five-Year Review to confirm that threats to human health and the environment have been addressed through the implementation of the selected remedy; and to evaluate specific elements of the remedy to verify that design, implementation, and operation of the remedy are functioning and/or performing as intended.

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2. SITE CHRONOLOGY

An overview of site chronology with significant milestones is displayed in Table 2-1. To ease the reader review, site chronology documented in the first Five-Year Review is shown in *italic*.

Table 2-1. Site Chronology

Activity/ Milestone	Date
NWPC placed on the Superfund National Priority List (NPL).	*October 14, 1992*
EPA conducted a CERCLA Removal Action on Parcel B, including perimeter fencing, warning signs, demolition of vacant buildings and off-site disposal of demolition debris.	*1993*
The Agency for Toxic Substances and Disease Registry (ATSDR) conducted a Health Assessment. ATSDR identified soil and the deep aquifer as exposure pathways and ambient air as a past exposure pathway.	*1995*
EPA issued special notices for potentially responsible parties (PRPs). These include Northwest Pipe and Casing, Mr. W. Hall, Jr., ODOT, and NWDC.	*June 1995*
EPA initiated a Remedial Investigation (RI) and Feasibility Study (FS).	*1996*
Consent Decrees between EPA, DEQ and PRPs entered in federal court. The consent decrees included monetary settlement to EPA and to the State for past and future costs.	*1997 to 1998*
Parcel B ownership transferred from W. Hall to DEQ, as trustee for EPA and DEQ.	*1997*
Approximately 230 tons of surface debris was removed from Parcel B prior to conducting the RI.	*1998*
EPA conducted a Baseline Risk Assessment.	*1998*
Final RI Report for OU1 and OU2, prepared by EPA's contractor Weston.	*August 1998*
Final FS Report for OU1 and OU2, prepared by EPA's contractor URS.	*August 1999*
Public comment period for proposed plan.	*January 31 to March 31, 2000*
The OU1 Record of Decision (ROD) was issued.	*June 29, 2000*
Phase 1 (soil excavation/treatment) of the Remedial Action (RA) for OU1 was conducted, including the thermal treatment and disposal t of 32,010 tons of material.	*August 1, 2001 through June 18, 2002*
The OU2 ROD was issued.	*September 27, 2001*
GCW pilot test performed to determine the implementability of the remedial alternative selected for OU2.	*January 2003*
Initiation of the RA for OU2, including the construction and operation of groundwater circulation wells (GCWs).	*July 2003*
Phase 2 of the RA (soil capping) for OU1 was completed, including the placement of a 2-foot clean soil cap on the Site.	*March 31, 2003 through September 8, 2004*
EPA issued the Explanation of Significant Differences (ESD) for OU1 which addressed primarily wetlands mitigation and restoration.	*March 3, 2004*
EPA completed the Preliminary Close Out Report documenting the completion of construction activities at the Northwest Pipe and Casing Superfund site.	*June 4, 2004*
EPA issued final acceptance letter to RA contractor for construction phases of OU1 and OU2 RAs.	*July 27, 2004*
Operational and Functional Determination for OU1 and OU2 issued by EPA.	*July 20, 2005*
State assumes responsibility for operation and maintenance of OU1.	*July 20, 2005*

Activity/ Milestone	Date
Start of Long Term Response Action (LTRA) for OU2.	*July 20, 2005*
Failure of well GCW-15.	*July 2005*
Ownership of Parcel B transferred from DEQ/EPA to Clackamas County through property sale. The county takes over operation and maintenance responsibilities for OU1. EPA retains responsibilities for OU2.	*October 5, 2005*
GCW-08 Evaluation Report, prepared by Parametrix (2006b)– GCW-08 is not performing as intended	July 25, 2006
First Five-year Review Report, prepared by Parametrix (2006c)	October 2, 2006
Shutdown of GCW 2,3,4,5,6,7, 8,and 10, removal of downhole equipment	November 17, 2006
Remediation System Evaluation (RSE) Site Visit/Interviews by EPA contractor GeoTrans	May 9, 2007
Shutdown of remaining GCWs 1, 9, 11, 12, 13, 14 and 15R; downhole equipment remains in place	May 24, 2007
Conduct Focused Field Investigation (FFI) at Plume 1 Source Area	October-November 2008
Memorandum Approving Time Critical Removal Action (TCRA), prepared by EPA	July 28, 2009
Easement and Equitable Servitude (EES) for ODOT Maintenance Facility Recorded	August 19, 2009
EPA Emergency Response and Removal (ERR) Unit conducts TCRA. Installation of soil amendment in Removal Area 1 and 2	September-November 2009
EES for NWDC Recorded	September 30, 2010

3. BACKGROUND

This chapter presents a brief overview of the Site's physical characteristics, current and future land and resource use, contamination history, initial agency response, and basis for taking action.

3.1 SITE LOCATION/GENERAL DESCRIPTION

The Site is located between SE Lawnfield and SE Mather roads in Clackamas County, Oregon, approximately 20 miles southeast of Portland (Figure 3-1). The Site lies immediately to the east of the Southern Pacific Railroad tracks and approximately 0.5 mile east of Interstate 205. The vicinity of the Site consists primarily of light industrial and commercial properties. The closest residential community is located approximately 0.5 mile south-southeast of the Site.

The Site covers approximately 53 acres of land and is divided into two parcels for the purposes of site management (Figure 3-2). This division is based on historical uses of the property. Parcel A consists of 21 acres, and was the historical location of the Northwest Pipe and Casing facility. Parcel B consists of 32 acres, and was the historical location of the Hall Process Company and the Northwest Pipe and Casing facility. OU1 addresses all contaminated soil and debris on parcel B; OU2 addresses all contaminated groundwater associated with the Site.

3.1.1 Parcel A

Parcel A is divided into two lots that are adjacent to SE Industrial Way.

The western lot (11 acres) is owned by ODOT. The property currently houses office/warehouse space, an equipment yard, and a greenhouse and plant nursery. A card-lock fueling station is located in the western end of the equipment yard. The majority of the lot is paved, with some landscaping on the northern and eastern portions. Four GCWs, two associated equipment sheds, and 12 monitoring wells associated with the remedial actions are also located on this lot.

The eastern lot (10 acres) is owned by NWDC. The property is currently occupied by the Clackamas Commerce Park and consists of three warehouse/office spaces and associated parking lots. The entire lot is paved, with the exception of landscaping on the northern portion. Eight monitoring wells associated with the Remedial Action (RA) are also located on this lot.

3.1.2 Parcel B

Parcel B is the location of former pipe-coating operations. As part of the RA for OU1, an engineered soil cap was placed on the entire 32-acre parcel and a 1-acre artificial wetland was constructed along a portion of the eastern property line. As part of the RAs for OU1 and OU2 a series of gravel roads transect the parcel and provide access to equipment sheds, wells, and office trailer. The current property owner of Parcel B, Clackamas County (County) leased Parcel B to Oregon Iron Works (OIW). In August 2009 OIW began development of a streetcar test track, maintenance facility, and laydown yard on Parcel B.

3.2 PHYSICAL CHARACTERISTICS

The following section describes the Site's physical characteristics, including topography, surface water drainage, geology, and hydrogeologic strata underlying the Site.

3.2.1 Physical Setting

The Site is located in a north-south trending valley bounded by Mount Talbert to the east and a low lying bluff to the west. Ground surface elevations at the Site range between 100 and 115 feet National Geodetic Vertical Datum 1988 (NGVD), with Mount Talbert approximately 740 feet NGVD and the western bluff approximately 150 feet NGVD (Weston 1998a). The valley is within the Portland Basin, a major structural depression trending north-southeast that is bounded by the Tualatin Hills to the west and the Cascade Mountains to the east.

3.2.2 Drainage

The Site is currently drained by north –trending manmade drainage ditches on the eastern and western boundaries of the Site. The drainage ditches flow to Dean Creek and Mount Scott Creek, which ultimately flow to the Willamette River (Weston 1998a). Surface water along the southern boundary of Camp Withycombe drains south to the Clackamas River, indicating that a surface water divide exists south the of Site (Weston 1998a). The regional drainage pattern of the Clackamas River and the area topography suggests that the valley in which the Site lies may have been formerly occupied by the ancestral Clackamas River.

The Site is susceptible to surface water ponding due to poor drainage features and a high water table in the winter and spring months. The ODOT maintenance building contains a number of floor sumps to manage standing water entering the building. Ponding from storm water runoff has been observed in the eastern parking lot of NWDC. Ponding is mainly due to the limited flow capacity of the eastern culvert pipe under Lawnfield Road, which restricts discharge from the parking area catch basins. To minimize stormwater ponding and soil erosion on Parcel B, OIW has implemented an EPA-approved grading plan (Harper et al. 2010).

3.2.3 Site Geology

Five distinct subsurface geologic units were identified at the Site (Weston 1998a; Parametrix 2006a):

- **Engineered Soil Cap.** Consists of locally imported silty soil and sandy soil that were blended and compacted (URS 2002a). The soil cap is approximately 2 feet thick and extends over Parcel B. The soil cap is part of the OU1 RA.
- **Fill Unit.** Consists of grayish brown silty gravel that was imported as fill material over much of Parcel B and portions of Parcel A. The fill unit is typically between 1 to 1.5 feet thick; however, it may be up to 5 feet thick in areas that were locally excavated. This unit does not include the fill material brought in as a cap as part of the OU1 RA.
- **Upper Silt Unit.** Consists of grayish brown sandy silt/silt having moderate to high plasticity, with some fine gravel. The upper silt unit is encountered at a depth of 5 to 10 feet below ground surface (bgs), and is interpreted as Holocene overbank deposits and lacustrine sediments deposited by the ancestral Clackamas River.
- **Upper Gravel Unit.** Consists of a grayish brown silty gravel in the upper portion of the unit (10 to 25 feet bgs) and grades to yellowish brown sandy gravel/gravel in the lower portion of the unit (25 to 90 feet bgs). Interbedded sands and silts of various thicknesses have been noted, but do not appear to be laterally continuous. The Upper Gravel Unit is interpreted as Pleistocene catastrophic flood deposit.
- **Lower Silt Unit.** Consists of greenish gray to black gray silt, dense, and hard. The unit is encountered between 90 feet and 110 feet bgs, and is interpreted to be Eocene

to Miocene low-energy environment deposit that may be associated with the ancestral Columbia River.

- **Lower Gravel Unit.** Consists of sandy gravel, which is encountered at approximately 110 to 135 feet bgs. The unit is interpreted to be the Troutdale Formation or equivalent.

3.2.4 Site Hydrogeology

Five hydrostratigraphic units are interpreted to occur beneath the Site (Weston 1998a; Parametrix 2007):

- **Shallow Water Bearing Zone (WBZ).** Corresponds to the upper portion of Upper Gravel Unit. The Shallow WBZ extends from approximately 15 to 25 feet bgs, and typically yields water at rates from 2 to 10 gallons per minute (gpm).
- **Intermediate WBZ.** The Intermediate WBZ extends from approximately 25 to 60 feet bgs, and typically yields water at rates from 10 to 25 gpm.
- **Deep WBZ.** Corresponds to the lower portion of the Upper Gravel Unit. The Deep WBZ extends from approximately 60 to 90 feet bgs. Hydraulic properties of this zone have not been determined; however, they are thought to yield water at rates greater than 20 gpm.
- **Confining Unit.** Corresponds to the Lower Silt Unit. The Confining Unit extends from 90 to 110 feet bgs. Hydraulic properties of the unit have not been determined; however, drillers' logs indicate the unit has poor water bearing properties.
- **Lower WBZ (Troutdale Gravel Aquifer equivalent).** Corresponds to Lower Gravel Unit, and is observed generally at depths greater than 100 feet bgs. The Lower WBZ is reportedly under confined conditions. The Troutdale Aquifer is an important and productive source of groundwater in the Portland Basin.

The Shallow, Intermediate and Deep WBZs are considered to be part of the upper WBZ. The Confining Unit separates the upper WBZ from the Lower WBZ.

Groundwater elevations in the Shallow and Intermediate WBZs range from 100 to 107 feet NGVD (see Section 6.5.2.1). Groundwater flow direction in the Shallow and Intermediate WBZs is approximately north to northwest. Natural groundwater hydraulic gradients vary seasonally and range from 1.0E-03 feet per foot (ft/ft) to 5.0E-03ft/ft.

3.3 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USE

The following section presents historic land use and a summary of Site activities at the Site. The Site is currently zoned for light industrial use. Future plans for the Site include the construction of a state highway connector (Sunrise Corridor) through a portion of Parcel A and Parcel B (Figure 3-2). The Sunrise Corridor will link Highway 212 with Interstate (I-205) and Highway 224. ODOT has determined that this link is necessary since it constitutes a significant route for commercial and industrial traffic from Clackamas County to the Interstate (I-5) corridor. Reasonably anticipated future land use for the remaining area of the Site is light industrial use/commercial.

3.3.1 Land Use

3.3.1.1 Parcel A

Current Use

In 1985 Parcel A was subdivided into an eastern and a western lot. The lots were bisected by Industrial Way. The western half of the property (11.8 acres) was purchased by ODOT for highway maintenance. ODOT constructed a warehouse, office space, equipment yard, and nursery on the western lot of Parcel A that are currently in use.

The eastern half of the property (9.1 acres) was purchased by NWDC, which built three low-lying buildings for commercial and light industrial use. Remaining portions of Parcel A are either paved or landscaped.

Both ODOT and NWDC retain ownership in their respective properties.

Future Use

Based on communications with Mark La Noue, NWDC, the future use of the eastern half of Parcel A will remain commercial and/or light industrial.

Based on communications with Thomas Picco, ODOT, the ODOT maintenance building will remain in place during and after the construction of the Sunrise Corridor Project.

3.3.1.2 Parcel B

Current Use

Current use of Parcel B is light industrial. The property was purchased from the State, as Trustee for EPA, by Clackamas County Development Agency (CCDA) on October 5, 2005. CCDA leased the property to OIW in August 2009. Under the lease agreement, OIW constructed a laydown yard on the northeast corner of Parcel B in the fall and winter of 2009. In 2010 OIW to expanded their existing use of Parcel B to include a streetcar test track and maintenance building. Development of the Site includes the installation of water, sanitary sewer and electrical lines, service roadway, railroad ballast rock and track, cantilever pole system, and a streetcar load out area to SE Mather Road. Development activities on Parcel B are required to be reviewed and approved by DEQ and EPA under the terms of an Easement and Equitable Servitude recorded with the property deed in 2005.

Future Use

The future use of Parcel B is intended to include the Sunrise Corridor Project which connects Highway 224 to I-205. The project will include a highway running from southeast to northwest across Parcel B. The final environmental impact statement (FEIS) for the project was issued in 2010 (Clackamas County et al. 2010).

3.3.1.3 Adjacent Property Current and Future Use

Property adjacent and in proximity to the Site is used for a variety of industrial and commercial purposes, such as metal fabrication and equipment manufacturing. Adjacent properties include the following:

- A large transmission tower and complex operated by KEX radio occupies a large open field north of the Site. Based on communications with Clackamas County Development Agency, an on/off ramp for the Sunrise Corridor Project is likely to be constructed on a portion of the KEX property.

- The National Guard Camp Withycombe facility operates southeast of the Site. Over the past 2 years, Camp Withycombe has extended its complex towards the southeast portion of Parcel B.
- In addition to the laydown yard and test track on Parcel B, OIW operates a manufacturing facility immediately east of the Site.
- A small residential area known as Hollywood Garden is located approximately 0.5 mile southeast of the Site (EPA 2000).

3.3.2 Current and Potential Future Use of Groundwater

Businesses and residences at and in the vicinity of the Site are connected to municipal water sources through the Clackamas County Water District (EPA 2001). No current use of groundwater for drinking water exists at or adjacent to the Site. The nearest potential receptor well is the KEX industrial well, located approximately 450 feet north of Parcel A and SE Lawnfield Road. The well is not used for potable water and has no observed detections of site contaminants in groundwater. The closest reported domestic well downgradient of the NWPC is located approximately 3,000 feet north-northwest of SE Lawnfield Road.

There are no immediate plans for groundwater beneficial use at the Site (EPA 2001). Groundwater use at the Site is restricted through the deed restrictions (recorded EES) in place with all current Site property owners. However, groundwater at the Site is considered to be a potential future source of drinking water and therefore is classified as Class II groundwater under the *EPA Guidelines of Ground-Water Classification, Final Draft* (December 1986).

3.4 HISTORY OF CONTAMINATION

Historical, on-site mishandling of wastes associated with pipe manufacturing and pipe-coating operations are the primary source of contamination at NWPC (Weston 1998a).

The major classes of contaminants include polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and chlorinated volatile organic compounds (CVOCs). Coal tar used for coating pipes was the main source of PAHs. PCBs most likely originated from cutting oils, hydraulic oils, cooling oils, and/or electrical transformers. PCB-contaminated soils may have been used for on-site dust suppression, based on their widespread distribution. Chlorinated solvents such as tetrachloroethene (PCE) and trichloroethene (TCE) were reportedly used during pipe coating and routine maintenance activities.

The Conceptual Site Model (CSM) (EPA 2000) indicated that the primary source of contamination was from historic waste disposal and buried wastes. Release of these contaminants to the environment was through the following mechanisms:

Release Mechanism	Affected Medium
Leaks and Spills	Surface and subsurface soils
Infiltration and leaching	Groundwater
Runoff/Erosion	Surface water
Runoff/Erosion	Sediments
Airborne particulates	Surface soils

3.4.1 Parcel A

No major sources of contamination were identified on Parcel A, although former employees alleged that small amounts of waste were disposed outside of the former Northwest Pipe and Casing manufacturing plant (not the ODOT building) (URS and CH2Mhill 1999).

3.4.2 Parcel B

Three large contaminated debris burial piles were encountered in soil during the site investigation. Buried debris consisted mostly of solidified coal tar fragments, milled wood, plastic, metal, and concrete. Several buried drums containing coal tar were also encountered during site investigation (URS and CH2Mhill 1999).

Soil underlying and surrounding the former pipe-coating plant buildings was impacted by coal tar and oils, most likely originating from poor housekeeping practices, spills, discharges, and product leaks from buried process lines.

Two USTs (1,000- and 12,000-gallon capacities) located near the former machine shop in the southern portion of Parcel B were the source of limited gasoline impacts to soil (URS and CH2Mhill 1999). The tanks were subsequently removed by DEQ.

3.5 INITIAL RESPONSE

In July 1986, EPA was contacted by a former employee of Northwest Pipe and Casing who alleged that dumping of waste had occurred north of Plant 4 and directly into the sewer. Improperly disposed waste included paint, paint thinner, xylene, paint bitumastic primer, and zinc chromate. It was also alleged that over 20 drums of coal tar and 200 drums of smoke stack scrubber waste had been dumped on site (EPA 2000).

An initial site visit was made by the EPA in July 1986 and a "Medium" inspection priority was assigned to the Site. The DEQ conducted a Preliminary Assessment and identified potential hazards at the site in September 1987 (DEQ 1987).

This was followed by a Preliminary Site Inspection in 1988 (E&E 1988) and a Listing Site Inspection in 1990 (E&E 1990), conducted by EPA after unsuccessful attempts by DEQ to have PRPs undertake remedial investigations at the Site. The Site was placed on the Superfund National Priorities List (NPL) on October 14, 1992.

EPA conducted a removal action in 1993 to provide site perimeter security fencing and to demolish site buildings being used by transients for shelter.

3.6 BASIS FOR TAKING ACTION

3.6.1 OU1 and OU2 ROD-based Remedial Actions

A CERCLA Remedial Investigation (RI) (Weston 1998a) and a baseline risk assessment (Weston 1998b) were completed by Weston in 1998. The RI confirmed that high levels of contaminants were present in soil, sediment, surface water and groundwater on or adjacent to the Site.

The baseline risk assessment confirmed that unacceptable carcinogenic and non-cancer risks existed at Parcel B for current transient trespassers, and/or future construction workers and maintenance workers through exposure to PAHs and PCBs via combined ingestion and dermal contact with soil.

The risk assessment also confirmed unacceptable cancer risk to future off-site adult and child residents exposed to PCE, TCE and vinyl chloride (VC) via combined ingestion of, dermal contact with, and inhalation of volatiles emitted from groundwater during all indoor use of tap water (EPA 2001).

3.6.1.1 2007 Sitewide Groundwater Monitoring

During the November 2007 Site Wide Groundwater Monitoring Event, a NAPL was discovered in monitoring well MW-207 located within the Plume 1 Source Area. The term DNAPL is used to describe the NAPL because it was observed at the bottom of the well and appeared to be denser than water during sampling. However, a thin floating sheen was also observed, and a minor component of the NAPL appeared to be buoyant when agitated.

Analysis of the DNAPL fraction indicated it was primarily composed of PAHs and VOCs with some PCBs and metals, and that the composition of the DNAPL fraction was similar to that of coal tar used at the Site (Parametrix 2008). Analytical results indicate elevated concentrations of CVOCs, aromatic compounds (BTEX), and naphthalene were present in both the DNAPL and groundwater (aqueous phase), as described in Table 3-1. The partitioning of these compounds into the aqueous phase is likely related to their relatively high solubility compared to PAHs and PCBs.

Table 3-1. Summary of Analytical Composition of DNAPL and Accompanying Aqueous Fraction from Well MW-207

Group	Analyte	DNAPL Fraction (mg/kg)		Aqueous Fraction (µg/L)	
VOCs	1,1,2 Trichloroethane (TCA)	N/A		1.3	
	(1-Methyl ethyl)-benzene	N/A		4.0	
	1-Methy-4-(1-methyle ethyl)-benzene	44	J	3.0	U
	1,2,4-Trimethylbenzene	1,031	J	135	
	1,3,5-Trimethylbenzene	200	J	24.9	
	1,1 Dichloroethene (DCE)	N/A		3.0	
	cis-1,2 DCE	710	J	522	
	trans-1,2 DCE	N/A		3.3	
	Benzene	N/A		1.2	
	Carbon Tetrachloride	N/A		1.0	U
	Ethylbenzene	252	J	102	
	MP-Xylene	362	J	126	J
	sec-Butylbenzene	59	J	N/A	
	n-Butylbenzene	84	J	1	
	o-Xylene	254	J	98.4	J
	Naphthalene	21,000	J	377	
	Propylbenzene	121	J	14.5	
	PCE	1,100	J	2,570	
	Toluene	N/A		25.5	
	Trans-1,3-Dichloropropene	N/A		3.0	J
	TCE	99	J	343	
	Trichloromethane	148	UJ	5.1	

Group	Analyte	DNAPL Fraction (mg/kg)		Aqueous Fraction (µg/L)	
	Vinyl Chloride	296	UJ	23.4	
PAHs	9H-Fluorene	38,000		1,000	J
	Acenaphthene	86,000		2,400	J
	Acenaphthylene	180		50	UJ
	Anthracene	5,600		200	J
	Benzo(a)anthracene	6,100		61	J
	Benzo(a)pyrene	1,000		50	UJ
	Benzo(g,h,i)perylene	170		50	UJ
	Benzo[b]fluoranthene	1,100		50	UJ
	Benzo[k]fluoranthene	920		50	UJ
	Chrysene	4,100		65	J
	Dibenzo[a,h]anthracene	92		50	UJ
	Fluoranthene	83,000		1,200	J
	Indeno(1,2,3-cd)pyrene	200		50	UJ
	Naphthalene	20,000		2,200	J
	Naphthalene, 2-methyl-	12,000		480	J
	Phenanthrene	170,000		3,100	J
	Pyrene	53,000		890	J
PCBs	PCB-1254	120		9.5	
Metals	Arsenic	38	UJ	2,000	U
	Barium	1.5		132	
	Cadmium	2.6	U	1,000	
	Chromium	8.5	U	10,000	U
	Copper	28.3		43,000	
	Manganese	4.0	J	3,520	
	Lead	21	U	17,000	
	Zinc	4.3	U	65	

Notes Qualifiers
U = not detected at or above the method reporting limit
J = estimated concentrations
Units
mg/kg = milligrams per kilogram
µg/L = micrograms per liter

3.6.1.2 Focused Field Investigation

A (FF) was conducted in October and November of 2008 to delineate the DNAPL source areas (coal tar bodies) and dissolved phase chlorinated solvents in the Plume 1 Source Area (Parametrix 2009). The goals of the FFI were consistent with recommendations in the First Five-Year Review Report and the Remedial System Evaluation (RSE) Report that additional groundwater characterization of the Plume 1 Source Area and revisions to the CSM were needed to determine if additional remedial actions were needed for the Site to address groundwater contamination.

The FFI evaluated former site features of concern including vertical drains, in-ground structures, and dumping areas where releases of coal tars and/or chlorinated solvents may

have occurred. The investigation consisted of completing 29 test borings up to 60 feet deep using Rotosonic drilling techniques. Up to three discrete groundwater samples were collected from each boring in the Shallow (25 feet), Intermediate (45 feet), and Deep WBZs (60 feet); and up to 25 discrete soil samples were collected from the saturated and unsaturated zones. In addition, two shallow and two intermediate monitoring wells were installed upgradient and cross-gradient of the Plume 1 Source Area to help fill gaps in the monitoring well network system.

Figure 3-3 displays features of concern, test boring locations, and the estimated lateral extent of three newly discovered coal tar bodies. The main coal tar body was located within the approximate footprint of Former Plant 3, with the source of contamination stemming from in-ground structures and southeast concrete pad area. It was thought that the two smaller coal tar bodies were located in the footprint of Former Plant 4, with the source of contamination stemming from the northwest concrete pad and vertical drain DR-04; however significant soil contamination was not found during the subsequent 2009 TCRA Analytical data suggests that PAHs and metals attenuated within or in close proximity to the coal tar bodies (Parametrix 2009).

3.6.1.3 2008 Sitewide Groundwater Monitoring

EPA conducted a sitewide groundwater monitoring event in November 2008 (Parametrix 2010) subsequent to the FFI. Groundwater was sampled and analyzed for PCE, TCE, cis 1,2-dichloroethene (cis 1,2-DCE), VC, and naphthalene. Groundwater monitoring results from the November 2008 event and discrete groundwater sample results from the FFI were utilized to portray the distribution of these contaminants in the Shallow, Intermediate, and Deep WBZs. Figure 3-4 through Figure 3-6 from the 2008 groundwater monitoring event display the distribution of PCE in groundwater for the Shallow, Intermediate and Deep WBZs. The data suggest that the nature and extent of PCE was greater than previously thought during the design and implementation of the groundwater RA, and that the source of PCE was from, or co-located with, the DNAPL source areas (coal tar bodies).

3.6.2 Contaminants of Concern

3.6.2.1 ROD-based Contaminants of Concern (COCs)

Table 3-2 identifies COCs for OU1 (soil) and OU2 (groundwater) and summarizes the maximum concentrations detected at the Site. COCs are selected based on potential human health exposure at the Site. They represent specific chemicals for which remedial action objectives and remedial goals (RGs) are established.

Table 3-2. Summary of Maximum Concentrations of COCs in OU1 and OU2

Operable Unit	Group	Contaminant	Maximum Detected Concentration
OU1 Soils	VOCs	Tetrachloroethene (PCE)	370 mg/kg
		Trichloroethene (TCE)	NA
		Vinyl Chloride	NA
	PAHs	Benzo(a)anthracene	950 mg/kg
		Benzo(b)fluoranthene	800 mg/kg
		Benzo(k)fluoranthene	530 mg/kg
		Benzo(a)pyrene	410 mg/kg
		Chrysene	2,100 mg/kg
		Dibenz(a,h)anthracene	89 mg/kg
		Indeno(1,2,3-cd)pyrene	250 mg/kg
	PCBs	Total PCBs	870 mg/kg
OU2 Groundwater	VOCs	Tetrachlorethene (PCE)	11,000 µg/L
		Trichloroethene (TCE)	320 µg/L
		Vinyl Chloride	100 µg/L

4. REMEDIAL ACTIONS

This chapter discusses implementation of the NWPC remedy, beginning with the description in the ROD and continuing through design, construction, and long-term operation and maintenance.

4.1 OU1 – SOIL

The operable unit for soil (OU1) addresses separate cleanup objectives and discrete actions undertaken on contaminated near-surface soils and debris.

4.1.1 Remedial Action Objectives

The NWPC ROD for OU1 was signed by EPA on June 2000 (EPA 2000) and is the regulatory instrument EPA used to select a remedy to address Remedial Action Objectives (RAOs). The RAOs are site-specific goals for protecting human health and the environment. RAOs were developed as a result of data collected during the RI and the baseline risk assessment to aid in the development and screening of remedial alternatives to be considered in the FS. The following RAOs for soil-specific COCs were developed:

- Prevent exposure of trespassers, future construction workers, and future maintenance workers through direct contact (ingestion or dermal contact) with contaminated soil that would result in an excess lifetime cancer risk greater than one in a million for individual carcinogens, above one in one hundred thousand for additive carcinogenic contaminants, or above a Hazard Quotient of 1.
- Prevent migration of soil contaminants to groundwater that would result in exposure to future off-site residents through direct contact (ingestion, inhalation, and dermal contact) with contaminated groundwater that would result in an excess lifetime cancer risk greater than one in a million for individual carcinogens, above one in one hundred thousand for additive carcinogenic contaminants, or above a Hazard Quotient of 1.

4.1.2 Selected Remedy

The ROD for OU1 (EPA 2000) identified soil and debris treatment and/or removal, placement of a clean soil cap, and institutional controls to protect cap integrity as the principal elements of the soil remedy. The major components of the selected remedy for OU1 described in the ROD include:

1. Removal and off-site disposal of Parcel B structures and features including subsurface piping, in-ground structure at Plant 3, underground storage tanks (USTs), aboveground tank with coal tar and metal bins containing refuse, soil piles 3 and 4, and drums of investigation-derived waste (IDW) soil.
2. Excavation of Parcel B soil exceeding Oregon Hot Spots levels (Table 4-1) and transportation to either 1) an off-site thermal treatment facility for thermal desorption, or 2) a landfill for disposal, if the soil contains PCBs greater than 50 mg/kg (parts per million), the maximum level allowed by the thermal treatment facility's permit;
3. Return of the thermally-treated soil to the site for placement as backfill in the excavated areas;
4. Placement of a two-foot thick, clean soil cap over Parcel B;
5. Construction of a surface water drainage system for Parcel B, if needed;

6. Erosion control actions during remedy construction to minimize impacts to surface water quality and critical habitat of federally listed threatened or endangered anadromous fish.
7. Implementation of institutional controls to limit human exposure to and warn of the hazards associated with chemicals of concern (COCs) in the soil underlying the cap on Parcel B, through the use of a restrictive covenant which will run with the land and a deed notice;
8. Long-term monitoring, inspections and maintenance of the site cap to ensure it remains protective.

Table 4-1. Criteria for Excavating Soil

Group	Contaminant of Concern	Threshold Concentrations (micrograms per kilogram)
VOCs	Tetrachloroethene (PCE)	39 µg/kg
	Trichloroethene (TCE)	40 µg/kg
	Vinyl Chloride	9 µg/kg
PAHs	Benzo(a)anthracene	250,000 µg/kg
	Benzo(b)fluoranthene	250,000 µg/kg
	Benzo(k)fluoranthene	250,000 µg/kg
	Benzo(a)pyrene	25,000 µg/kg
	Chrysene	25,000,000 µg/kg
	Dibenz(a,h)anthracene	25,000 µg/kg
	Indeno(1,2,3-cd)pyrene	250,000 µg/kg
PCBs	Total PCBs	20,000 µg/kg

4.1.3 Explanation of Significant Differences

An Explanation of Significant Differences (ESD) (EPA 2004) for OU1 was completed in March 2004. The ESD describes two significant differences from the original OU1 ROD:

- The cleanup level of VC at the Site was raised from 0.1 µg/kg to 1.0 µg/kg as a result of the analytical laboratories being unable to guarantee the consistent analysis of VC in soil at or below the original 0.1 µg/kg cleanup level. EPA and DEQ concluded that raising the cleanup level to 1.0 µg/kg would still be protective of groundwater at the Site.
- Site visits after completion of the RI (which concluded that no wetlands were present on site) identified several suspected wetland areas. Wetland delineation was performed and identified six wetland areas on Parcel B with a total area of approximately 1 acre. The Basis of Design Report (URS 2003a) for the soil cap identified additional applicable or relevant and appropriate requirements (ARARs) regarding wetlands, including the need to mitigate for wetland losses. Since the planned soil cap construction would destroy these wetland areas, EPA determined that a new 1-acre wetland should be created on site (coincident with soil cap construction) to compensate for loss of the existing wetland areas.

4.1.4 Remedy Implementation

The implementation of the RA for OU1 occurred in two phases. Phase 1 included the excavation, treatment, on-site management, and/or off-site disposal of contaminated soil or "hot spots", and removal of buried drums and storage tanks. Phase 1 was completed between June 2001 and December 2001 by EPA's Oversight Contractor URS, with support from URS's subcontractor Remtech (URS 2002a; 2002b).

Phase 2 included the installation of a 2-foot-thick engineered soil cap on Parcel B, construction of a 1-acre mitigation wetland in the northeast corner of Parcel B, and placement of ICs. Phase 2 construction activities were conducted between July 2003 and July 27, 2004 (URS 2004).

EPA determined the OU1 RA was operational and functional in July 2005, at which time. DEQ took over official responsibility for operation and maintenance (O&M) for the soil cap and wetland. With the sale of Parcel B to Clackamas County in October 2005, legal responsibility for O&M of the soil cap, fencing, and constructed wetland transferred to CCDA. DEQ conducted wetland monitoring and maintenance through 2008, with monitoring and maintenance activities transferred to CCDA in 2009.

4.1.5 Long-term Operation and Maintenance

EPA entered into an agreement dated May 4, 2001, "Superfund State Contract Between EPA and the State of Oregon for Remedial Action at the Northwest Pipe and Casing Company/Hall Process Company" and amended it May 14, 2003, in which the State assures that ICs, considered part of long-term O&M of implemented remedial action, will be monitored and retained as part of O&M.

4.1.5.1 Parcel A

An EES for the ODOT property between ODOT (grantor) and DEQ (grantee) was memorialized on August 19, 2009 (DEQ and ODOT 2009). The EES, with respect to OU1, places restrictions on groundwater use, access, land use, new construction, and development for the ODOT property on Parcel A. The EES places restrictions on ODOT property land use that will or likely will jeopardize the functional integrity of the engineered soil cap on Parcel B. The EES also requires ODOT to provide notice of real property transfer and/or partitioning, and zoning changes. The restrictions put in place by the EES run with the property.

An EES for NWDC property between Mark La Noue and Christine Rollins La Noue (grantor) and DEQ (grantee) was memorialized on September 30, 2010 (DEQ and NWDC 2010). Similar to the EES for the ODOT property, the EES places restrictions on groundwater use at the NWDC property and restricts land use that will interfere with investigative or response activities at the property. The EES also requires NWDC to provide notice of property transfer. The restrictions put in place by the EES run with the property.

4.1.5.2 Parcel B

ICs

Parcel B was sold to CCDA in September 2005. Coincident with the sale, ICs specified by the soil and groundwater RODs for Parcel B were put into place via execution of several documents. These documents include an EES memorialized on October 6, 2005 (DEQ and CCDA 2005), Agreement for Release and Waiver of Liens (Lien Waiver), Waste

Management Plan (EPA 2005), Soil Cap Monitoring and Maintenance Plan (DEQ and EPA 2005), and a Wetland Mitigation and Monitoring/Maintenance Plan (URS 2003b).

The EES places restrictions on groundwater use, access, land use, development, and new construction. The EES also requires CCDA to notify EPA and DEQ of property transfer and/or portioning. The EES and the Lien Waiver restrict any use of the property that will penetrate, disturb and/or could jeopardize the integrity of the soil cap. The property owner is required to maintain the soil cap in accordance with the Soil Cap Monitoring and Maintenance Plan. The EES restricts operations and/ or use of the property that will or likely will impair the proper functioning of the 1-acre wetland in the northeast corner of the property without written approval by the DEQ. The restrictions put in place by the EES run with the property.

Engineered Soil Cap

As the soil cap exists to serve as a physical barrier preventing direct human contact with the residual, low-level contaminants in the soil on site, inspection and maintenance is required to ensure that the barrier remains intact. The soil cap on Parcel B is inspected regularly by the property owner using procedures and criteria outlined in the Soil Cap Monitoring and Maintenance Plan (DEQ and EPA 2005). The plan outlines specific procedures for monitoring and maintaining the integrity of the cap. Soil Cap Inspection Reports are prepared by the property owner and submitted to EPA and DEQ. Currently, the schedule for conducting cap inspections is quarterly.

On-site activities that breach or penetrate the soil cap must follow procedures and protocols in the Waste Management Plan (EPA 2005). The plan details requirements relating to the identification, management, and disposal of waste derived from these activities. The plan is intended to ensure that contaminated soil, groundwater, and other derived waste materials are managed properly and cap integrity is maintained. The plan outlines the following requirements for management and disposal of waste:

- Soil removed from within the existing soil cap is considered clean soil and may be managed on the Property without any restrictions.
- Backfill removed from below the soil cap and within the boundary limits of Excavation Areas 1 through 7 may be managed on the Property, provided that a protective cap must be placed over such soil in accordance with applicable portions of the plan. Backfill managed under this shall be segregated to avoid commingling with soil from the overlying cap and soil from outside or below the backfill.
- All other soil removed from below the soil cap shall be managed in accordance with applicable portions of the plan, which include but are not limited to testing of excavated and in-situ soils.

Wetland Area

For the first 5 years following the completion of the wetlands, an annual assessment was required to be performed during July or August to satisfy the Wetland Mitigation and Monitoring/Maintenance Plan (URS 2003b). The plan laid out success criteria for the wetland, which included:

- Percent aerial coverage of native vegetation;
- Percent aerial coverage of rock, surface water, and/or large woody debris;
- Assessment of vascular, nonvascular, and nonnative species;

- Assessment of water regime, which requires that the upper 10 inches of the soil profile are saturated for at least 14 days during the growing season; and
- Erosion monitoring, with areas of erosion filled and reseeded per specifications.

The last of the annual assessments occurred in 2008. Clackamas County is currently responsible for maintaining the wetland.

4.2 OU2 – GROUNDWATER

The operable unit for groundwater (OU2) addresses separate cleanup objectives and discrete actions undertaken on contaminated groundwater. Groundwater means any water beneath the land surface, except capillary moisture, and within the boundaries of the Site.

4.2.1 Remedial Action Objectives

The NWPC ROD for OU2 was signed by EPA in September 2001 (EPA 2001) and is the regulatory instrument EPA used to select a remedy to address RAOs. RAOs for OU2 were selected based on the NCP and the Oregon Environmental Cleanup Rules (OECRs). The OECRs are more stringent than the MCLs and therefore are the cleanup goals that must be met to satisfy all RAOs. The following describes the RAOs for groundwater-specific COCs that were developed for OU2:

- Prevent exposure of future off-site residents and future on-site maintenance workers from direct contact (ingestion, dermal contact, and inhalation) to contaminated upper aquifer groundwater that would result in an excess lifetime cancer risk greater than one in a million for individual carcinogens, above one in one hundred thousand for additive carcinogenic contaminants, or above a Hazard Quotient of 1.0. The remedial goals (RGs) are the OECRs for drinking water, risk-based cleanup option:
  - 1 µg/L for PCE
  - 1.6 µg/L for TCE
  - 1 µg/L for VC
- Prevent migration of upper aquifer groundwater to off-site areas or deeper aquifers with contaminant concentrations that would result in an excess lifetime cancer risk greater than one in a million for individual carcinogens, above one in one hundred thousand for additive carcinogenic contaminants, or above a Hazard Quotient of 1.
- Restore use of the upper aquifer groundwater as a drinking water source. The goals for restoration are the federal and state safe drinking water standards (maximum contaminant level [MCLs]):
  - 5 µg/L for PCE
  - 5 µg/L for TCE
  - 2 µg/L for VC
- The OU2 ROD also notes the cleanup levels established for soil on site as they were calculated using the above groundwater concentrations. These cleanup goals (Table 4-2) are intended to reduce the potential for VOCs sorbed onto soil particles from partitioning to groundwater.

Table 4-2. Soil Cleanup Levels for COCs

Group	Contaminant of Concern	Soil Cleanup Level (micrograms per kilogram)
VOCs	Tetrachloroethene (PCE)	7 µg/kg
	Trichloroethene (TCE)	13 µg/kg
	Vinyl Chloride	0.1 µg/kg
PAHs	Benzo(a)anthracene	2,500 µg/kg
	Benzo(b)fluoranthene	2,500 µg/kg
	Benzo(k)fluoranthene	2,500 µg/kg
	Benzo(a)pyrene	250 µg/kg
	Chrysene	250,000 µg/kg
	Dibenz(a,h)anthracene	250 µg/kg
	Indeno(1,2,3-cd)pyrene	2,500 µg/kg
PCBs	Total PCBs	1 mg/kg

4.2.2 Selected Remedy

The OU2 ROD (EPA 2001) identifies the cleanup strategy for groundwater as source control, treatment, natural processes, and ICs (Alternative G3a). The ROD calls for the most highly contaminated groundwater to be treated with in-situ air stripping wells (GCWs). The ROD stated that areas of lesser contamination were to be addressed through natural processes. The major components of the selected remedies described in the OU2 ROD include:

1. Installation of approximately 10–in -situ GCWs in the highest COCs concentration areas of the upper WBZ Plumes 1 through 4. The wells would be connected to five equipment sheds that house a blower, vapor extraction, and activated carbon canisters for treatment.
2. Installing groundwater monitoring wells in the vicinity of the treatment wells to evaluate their effectiveness over time for reducing COCs concentrations in groundwater.
3. Installation of four in-situ GCWs and equipment sheds in the vicinity of Lawnfield Road to prevent off-site migration of contaminated groundwater. The wells would remove COCs from groundwater before it is moved off-site.
4. Installation and annual sampling of groundwater monitoring wells to evaluate the progress towards attaining groundwater RGs. To ensure that the RGs continue to be maintained after attainment, groundwater monitoring will continue annually for the first 5 years after attainment, and then every 5 years after.
5. Using natural processes outside of the source areas to reduce COCs concentrations in groundwater.
6. Operating the in-situ air GCWs for a minimum of 5 years, during which EPA expects that groundwater COCs in the source areas of the plumes and in the vicinity of Lawnfield Road would decline up to 75 percent. Treatment performance data will be carefully monitored on a regular basis.
    - If the performance data collected during operation show that this expected decline in COCs is not being achieved, EPA will adjust system operations.
    - If the system performance data confirm the expected COCs concentration decline is being achieved after 5 years, then EPA will discontinue operation of the in-situ air stripping wells.

7. Placing and enforcing ICs on Parcel B and the western lot of Parcel A to limit future use of groundwater until such time as MCLs are achieved, and to ensure EPA access for treatment systems operation, maintenance, and monitoring.

4.2.3 Explanation of Significant Differences

An ESD for OU2 Groundwater Remedy was completed in December 2008 (EPA 2008). The ESD amends the ROD for OU2 to include ICs on the eastern portion of Parcel A, the NWDC property, to address the following concern raised in the First Five-Year Review:

- Groundwater impacts exceeding RG have recently extended onto the NWDC property; however there is no ROD requirement that beneficial use restrictions be placed on this property.

The significant difference is identified as an additional RAO requiring the imposition of ICs on the eastern portion of Parcel A. The ICs include restricting domestic groundwater use on this property until RG is met. An EES or similar restrictive document was required to be negotiated between DEQ and NWDC, and recorded in Clackamas County to implement the ICs (described in Section 4.1.5.1).

4.2.4 Remedy Implementation

4.2.4.1 ICs

The EESs for the ODOT, NWDC, and CCDA properties (described in Sections 4.1.5.1 and 4.1.5.2 above) place restrictions on groundwater consumption or other beneficial uses.

4.2.4.2 GCWs

Construction of the groundwater remedy began in 2003, followed by startup, shakedown and EPA acceptance in early 2004. Substantive requirements for the design of groundwater treatment and monitoring and development of project plans and specifications were provided in the Basis of Design Report (URS 2003a).

EPA determined the OU2 RA was operational and functional in July 2005, thus marking the official start of the 10-year Long-Term Response Action (LTRA) period for OU2. The LTRA is the period up to 10 years when EPA continues to fund operation of a groundwater remedy which involves the restoration of groundwater quality to a level that assures protection of human health and the environment. Since DEQ did not request to be the lead agency for conducting the LTRA, EPA has maintained the primary responsibility for conducting the LTRA. CDM Constructors, Inc., Portland, Oregon, conducted O&M on 15 GCWs and six equipment sheds (EQ-01 through EQ-06) from March 2004 to May 2007. The effort included vault inspections, flow measurements, alarm response, packer inflation, equipment logs, vapor sampling and analysis, and site security.

Performance monitoring of GCW treatment systems was conducted by URS Corp., Portland, Oregon, from March 2005 to July 2005, and by Parametrix, Portland, Oregon, from August 2005 to February 2007. Performance monitoring included air stripper sampling and analysis, collecting monitoring well water level elevations, and sitewide groundwater sampling and analysis.

The GCWs were determined to not be functioning as intended and were not effective in removing contaminant mass or hydraulically containing impacted water from migrating horizontally or vertically (GeoTrans 2007). As recommended in the RSE report, the operation of the GCWs was terminated. Ineffectiveness of the GCWs was due in part to design and

constructability which required the installation of oversized wells and packer systems, and implementation where well installation created short-circuiting between well screens. In addition, the nature and extent of contamination in the Plume 1 Source Area was not recognized during the placement of GCWs 9, 10, 15.

Eight GCWs (2, 3, 4, 5, 6, 7, 8 and 10) were shut down on November 17, 2006. Submersible pumps and packers within these wells were removed, inventoried and stored on site. The seven remaining GCWs (1, 9, 11, 12, 13, 14 and 15R) were shut down on May 24, 2007. Downhole equipment in these wells remains in place. Activated carbon and zeolite filters remain in place in the equipment sheds. All treatment system equipment remains in place with vaults and equipment sheds.

No further operation and maintenance occurred on the GCWs or equipment sheds after May 24, 2007. Long-term annual site-wide groundwater monitoring currently continues. The focus of this monitoring has shifted from evaluating the performance of the GCWs to evaluating the nature and extent of contamination and dechlorination indicators (see Section 6).

4.3 TIME CRITICAL REMOVAL ACTION

In February 2009, EPA determined that the residual source of DNAPL in subsurface soils was a chronic source of dissolved hazardous substances to groundwater and that no further effective action could be taken on the groundwater remedy until the residual source of DNAPL was removed. EPA requested assistance from the Removal Program in May 2009 to remove the source of soil contamination so that a modified groundwater remedy could be implemented. DEQ concurred with the proposed removal action in a letter to EPA on July 20, 2009 (DEQ 2009a).

EPA prepared a 2009 Action Memorandum to request a TCRA and document its approval (EPA 2009). EPA determined that the residual source of DNAPL could pose a future threat to drinking water supplies; the total time and cost for eventual cleanup would increase the longer the residual sources of DNAPL in subsurface soils remained unaddressed; and that removal of the residual source of DNAPL was technically feasible, appropriate, and provided an effective solution. The implementation of the TCRA supported the achievement of RAOs for both OU1 and OU2 by removing contaminated soil above established cleanup levels and removing a long-term source of groundwater contamination at the Site. In addition, a timely response was warranted due to pending economic development of the Site. This development included OIW building a streetcar maintenance building and test track as an extension of their main facility to the east of the Site, and the building of Phase I of ODOT Sunrise Corridor, which links Highway 212 to I-205 (Section 3.3.1.2). Access to identified residual sources of DNAPL would be limited during construction and operation of these facilities.

4.3.1 Implementation of Removal Action

A Removal Action Memorandum was prepared by EPA and signed by the acting Regional Division Director on July 28, 2009 (EPA 2009). The RA started on August 11, 2009, when EPA and its contractors used a small excavator to dig holes and look for contaminated soil around the proposed excavation areas to more accurately delineate the excavation boundaries.

Between September 1 and November 13, 2009, EPA and its contractors performed the excavation work; treated excavation groundwater on site, discharging it to the sanitary sewer; backfilled the area with amended, imported fill; and transported approximately two-thirds of the excavated soil off site to a subtitle D disposal facility. The remaining excavated soil was completely enclosed in Duraskrim sheet plastic and left on site for later removal.

The TCRA was completed in June 2010 with the removal of stockpiled waste soil from the Site.

4.3.1.1 Excavation

The existing soils cap at both excavation areas was removed and stockpiled on site for later replacement. Slide-shoring was used in Excavation Area 1 which was approximately 80 feet long by 24 feet wide and 25 feet deep. The slide-shoring was removed as backfill was added to the excavations. Backfill consisted of clean, imported sand or gravel and soil amendment.

At the start of the Removal Action, Excavation Area 2 was anticipated to be approximately the size of Excavation Area 1. However, after removing the overburden from the anticipated area of Excavation Area 2, most of the contamination was seen to be in a smaller area along the north edge of the exposed area. Due to this change in site conditions, it was decided to modify Excavation Area 2 resulting in a long narrow trench which extended from the northeast corner of Excavation Area 1 to within approximately 40 feet of the eastern boundary of Parcel B.

4.3.1.2 Soil Stockpiling

During excavation, excavated soil was placed in one of 14 containment cells and dewatered, then tested for contaminants at levels of concern with respect to the Subtitle D disposal facility. Excavated soil was then stockpiled on site, and ultimately 24,798 tons of excavated soil was transported off site as nonhazardous waste by private trucking companies to the Subtitle D facility at the Wasco County Landfill for disposal. After the stockpiled soil was removed from the Site, the protective soil cap was restored and reseeded with a ROD-appropriate mixture.

4.3.1.3 Dewatering and Groundwater Treatment

In order to allow for soil to be excavated, groundwater had to be continuously pumped to the on-site groundwater treatment system which was constructed as part of the RA. The saturated soils that were removed from the excavation were placed in lined containment cells where they were allowed to dewater for several days. The water from the containment cells was also processed through the on-site groundwater treatment system. The treatment facility consisted of a two-stage pump system to move water from the bottom of the excavations to the ground surface and then to the water treatment facility: five 21,000-gallon holding tanks for contaminated water, a tank pump and metering system to add Chitosan flocculent in line, sand filters, cloth bag filters, pH adjustment equipment, two 5-ton granular activated carbon (GAC) treatment tanks, ten 21,000-gallon tanks for treated water, a volumetric meter and piping to gravity drain the water to the sewer intake, and numerous pipes and pumps to move the water through the treatment facility. A total of 551,000 gallons of treated groundwater was tested and discharged to the Clackamas County Wastewater Treatment system under permit obtained for the RA.

4.3.1.4 Soil Amendment

Excavation areas were backfilled with sand, gravel, and existing overburden and cap material where appropriate. The seven excavation bays farthest west and south in EA1 were dosed with "ChitoRem", a soil amendment made from the chitin in crab shells. The zero-valent iron-organic carbon soil amendment "Daramend" was dug into the base of all the other excavation bays in EA1 and dosed into the backfill at either 0.6 percent or 1 percent concentrations to intercept groundwater flowing through the excavation area. The backfill and 3 feet of soil below the base of EA2 were dosed at a rate of 1 percent with Daramend.

The soil amendments mixed into the backfill and at the bottom of the excavations are intended to accelerate attenuation of remaining contaminants in soil and in groundwater reentering and downgradient from the excavated area, by promoting reduced groundwater conditions and providing a source of organic carbon for indigenous microorganisms within and downgradient of the source area.

4.3.2 Post-removal Monitoring

In addition to collecting water levels and VOC samples from Shallow and Intermediate WBZ wells in the immediate vicinity of the removal areas, a number of dechlorination indicators are being monitored in an effort to determine the ongoing effectiveness of the soil amendment. These indicators include dissolved iron (a source of reducing conditions), methane (an indicator of anaerobic biological activity (methanogenesis)), chloride (an indicator that dechlorination is occurring), redox potential (indicating oxidative or reducing conditions), and sulfate (an inverse indicator of anaerobic biological activity (sulfate reduction)).

5. PROGRESS SINCE LAST REVIEW

This section discusses progress since the last Five-Year Review Report. It provides the protectiveness statements for the operable units, and the status on issues and/or recommendations with resulting follow-up actions.

5.1 PROGRESS SINCE THE FIRST FIVE-YEAR REVIEW

Table 5-1 below provides a summary of issues and recommendations identified in the First Five-Year Review Report (Parametrix 2006c). Table 5-2 includes a summary of additional issues identified in the RSE Report (GeoTrans 2007) and associated recommendations. The table also includes updates on actions taken and outcomes by responsible parties. A description of each action taken and outcome, if any, are provided below the table.

Table 5-1. Summary of Issues and Recommendations from the First Five-Year Review

Issue	Recommendations and Follow-Up Actions	Party Responsible	Action Taken and Outcome	Date of Action
		OU1		
The cancer slope factor for TCE is under review by EPA.	Evaluate the impact of any final change in TCE cancer slope factor to soil RAOs and RGs.	EPA	EPA has still not officially published a new slope factor for TCE.	
Invasive weeds are encroaching into the constructed wetland and the wetland buffer.	Continue weed removal as needed.	DEQ	Responsibility of wetland and wetland buffer transferred to CCDA. Removal of invasive weeds is performed on an as-needed basis by Clackamas County employees.	10/05/05
Plants in the wetland buffer are stressed due to lack of water.	Provide water to plants as needed.	DEQ	Responsibility of wetland and wetland buffer transferred to CCDA. Supplemental watering of the wetland is conducted by CCDA using a newly installed municipal water line for the OIW facility.	10/05/05
		OU2		
Groundwater on NWDC property exceeds the RGs for PCE and TCE, yet beneficial use of groundwater on NWDC is not restricted by ICs.	Issue an ESD to require ICs on NWDC for groundwater use. Negotiate an EES between DEQ and NWDC to implement the ICs.	EPA & DEQ	EPA issued an ESD for OU2 groundwater remedy (Section 4.2.3). The ESD identifies ICs for the eastern lot of Parcel A (a.k.a. NWDC property). An EES on the NWDC property was recorded on September 30, 2010. The EES restricts groundwater use on the property, and assures access for monitoring purposes and to	9/30/10

Issue	Recommendations and Follow-Up Actions	Party Responsible	Action Taken and Outcome	Date of Action
			the treatment system.	
Groundwater use restrictions ICs on ODOT property have not been implemented as required by the ROD.	Negotiate an EES between DEQ and ODOT.	DEQ	An EES on the ODOT property was recorded on August 19, 2009. The EES restricts groundwater use on the property, and assures access for monitoring purposes and treatment system operation.	8/19/09
PCE and TCE concentrations in off-site groundwater are increasing.	Evaluate effectiveness of existing remedy and take necessary further response action to control off-site migration.	EPA	Evaluation of GCWs along the downgradient property boundary determined that they had a limited ability to hydraulically control and treat groundwater. Currently no active remedy is in place. Groundwater concentrations are being monitored for natural attenuation. PCE and TCE concentrations in off-site wells have remained relatively stable over the last several years near or below RGs.	August 2009
Contaminant mass removal rates and groundwater extraction rates of existing GCWs in source areas are either low or declining. It is currently not known if the groundwater cleanup will meet MCLs in the source areas in the 5- to 10-year time frame presented in the ROD.	Investigate causes and take necessary corrective actions to attain acceptable COC mass removal and groundwater extraction rates.	EPA	Evaluation of GCWs determined that they were ineffective in removing mass and unlikely to meet MCLs in a 10-year timeframe. The wells were shut down to save costs for determining and implementing a future groundwater remedial action. It should be noted that the ROD established a 50 year time frame to achieve all cleanup goals for the site.	5/24/07
PCE and TCE contaminated groundwater associated with Plume 1 Source Area is migrating laterally and downward in the Intermediate WBZ. No GCWs are present to treat this groundwater.	Implement further response actions to treat source area groundwater in the Shallow and Intermediate WBZs associated with Plume 1.	EPA	The TCRA was implemented to reduce Plume 1 Source Area contaminants and help treat chlorinated contaminants present in the downgradient Intermediate WBZ.	August 2009

Issue	Recommendations and Follow-Up Actions	Party Responsible	Action Taken and Outcome	Date of Action
GCW system performance has decreased due to problems such as well screen bio-fouling, reduced ZOI, equipment failures, etc.	Identify causes of decreased performance and implement corrective actions to either improve operational performance of GCWs or use a different technology.	EPA	See response regarding decreased mass removal rates above.	5/24/07
Natural degradation of groundwater COCs on site is not adequately documented.	Gather additional data on COC natural degradation processes occurring on the Site.	EPA	Procedures and protocols in the Quality Assurance Project Plan (QAPP) were modified to include the reporting of chlorinated ethene and naphthalene, and the sampling and analysis of dechlorination indicators.	11/10/08
Potential exposure to on-site workers from indoor air vapor intrusion associated with contaminated groundwater.	Further evaluate the indoor air exposure pathway. Communicate results to building occupants on Parcel A. Implement necessary actions to address unacceptable exposure impacts.	EPA	Indoor air was evaluated for on-site workers at the ODOT facility on Parcel A. Results of the indoor air evaluation indicated that the only chlorinated solvent that exceeded the calculated worker screening level was a single TCE result. This sample only slightly exceeded the screening level, so lifetime cancer risks greater than 1E-05 are not expected (EPA 2008). The EPA recommends additional indoor air sampling if concentrations of chlorinated compounds in groundwater increase over time	September 2007
GCW O&M costs are higher than ROD estimates.	Identify and implement actions to reduce O&M costs.	EPA	GCWs were shut down to induce cost savings for future remedial actions to the groundwater operable unit.	5/24/07
An undetermined source area of groundwater contamination may exist in the vicinity of the ODOT facility.	Investigate area to identify possible source of VOCs and implement any necessary response actions.	EPA	EPA evaluated CVOC concentrations in the vicinity of the ODOT facility and determined that contaminant concentrations are decreasing and levels are not indicative of a separate source. Further subsurface investigation is unwarranted.	November 2010

As a result of a site visit and interviews with pertinent parties, RSE contractor GeoTrans raised issues and made recommendations (GeoTrans 2007) which complimented those issues and recommendations made in the first Five-Year Review (Parametrix 2006c). RSE issues and recommendations are summarized in Table 5-2 below.

Table 5-2. Summary of Issues and Recommendations from the RSE Report

Issue	Recommendations and Follow-Up Actions	Party Responsible	Action Taken and Outcome	Date of Action
RSE	Improve delineation of Plume 1 to the south of in the shallow WBZ	EPA	Further delineation of the Plume 1 Source Area was completed during the FFI and through the installation of monitoring wells MW-208 through MW-214.	October 2008
RSE	Finalize ICs on Parcel A	EPA and DEQ	Completed. See responses in Table 5-1 regarding implementation of ICs on parcel A	12/18/08
RSE	Evaluate potential for vapor intrusion on Parcel A	EPA	Completed. See response in Table 5-1 regarding vapor intrusion evaluation.	September 2007
RSE	Eliminate operation of GCWs	EPA	Completed. See responses in Table 5-1 regarding shutdown of GCWs.	5/24/07
RSE	Revise sequencing for collecting sitewide water level data	EPA	Monitoring well measuring point elevations (MPE) were resurveyed for the entire site. The resurvey indicated that a significant discrepancy occurred in the survey information between monitoring wells installed by Weston during the RI and monitoring wells installed by URS during remedial design. Re-contouring water level data using new MPE produced a fairly uniform flow direction to the north-northwest. In addition, the Contractor is collecting sitewide depth to water level measurements with a 24 hour period.	June 2008

6. FIVE-YEAR REVIEW PROCESS

This section describes activities performed during the Second Five-Year Review process, and provides a summary of relevant findings.

6.1 ADMINISTRATIVE COMPONENTS

The approach used to conduct this Five-Year Review followed EPA Comprehensive Five-Year Guidance, and Task Order 48 Final Work Plan Assignment, Parametrix, dated November 9, 2010. Specific work plan tasks included:

- Community Relations (Task 02);
- Background Document Review (Task 03);
- Standards Review (Task 04);
- Site Visit/Site Review (Task 05;)
- Site Inspection/Technology Review (Task 06); and
- Preparation and Submittal of the Five-Year Review (Task 07).

The Five-Year Review effort was led by EPA Region 10 remedial project manager (RPM) Mr. Mark Ader, and was assisted by the EPA Community Involvement Coordinator (CIC) Judy Smith, by EPA Attorney-Advisor Mary Queitzsch, by EPA Region 7 (AES) Contract Officer Yolanda Nero, by EPA Senior Policy Advisor Tim Brincefield and by Parametrix's Project Manager Ken Fellows. The Five-Year Review was conducted from November 9, 2010, to May 30, 2011.

6.2 COMMUNITY NOTIFICATION AND INVOLVEMENT

Community involvement is an important component of the Five-Year Review process. A notice was placed in the Clackamas County newspaper in April 2011. A copy of the notice is included in Appendix A. EPA has provided specific information on the Five-Year Review and its objectives, and completed interviews with state and county leaders and adjacent property owners.

6.3 STANDARDS REVIEW

6.3.1 Applicable or Relevant and Appropriate Requirements Analysis

Applicable or relevant and appropriate requirements (ARARs) were reviewed to identify new or updated state and/or federal regulatory standards that might affect the protectiveness of the selected remedy for OU1 and OU2 if their respective RODs were written today.

6.3.1.1 OU1

Remedial Goals

Contaminant-specific standards used to set the remedial goal (RGs) were compared to present day values to assess continued protectiveness of the remedies. RGs for COCs are based on:

1. Oregon Environmental Cleanup Rules (OAR 340-122) for industrial or commercial land use, Oregon Solid Waste Management Rules (OAR 340-093 to 097), Oregon Hazardous Waste Management Rules (OAR 340-100 to 120) and the Federal PCB Regulations 40

CFR 761.61. These rules address future on-site worker exposure from direct contact or ingestion of contaminated soil above an excess lifetime cancer risk of 1E-06 for individual carcinogens or above a Hazard Quotient (HQ) of 1 for non-carcinogens.

2. Oregon Environmental Cleanup Rules - risk-based cleanup levels under OAR 340-122-040(2)(a). These rules were found to be applicable for soil at the Site to address leaching of contaminated soil to groundwater that would result in exposure of future off-site residents through ingestion of drinking water above an excess cancer risk of 1E-06 for individual carcinogens or above a HQ of 1 for non-carcinogens.

Risk based numerical values under the Oregon Environmental Cleanup Rules have been revised on several occasions since the ROD for OU1 was issued in 2000 to incorporate changes in toxicity studies. Comparison of RG numeric values to current and applicable Risk Based Concentrations (RBCs) (DEQ 2009b) criteria indicates that the RG values are more stringent than RBCs. As such, changes in risk based values do not adversely affect protectiveness.

Hot Spot Soils

The ROD identified the treatment of Hot Spot soils to the extent feasible pursuant to Oregon Environmental Cleanup Rules (OAR 340-122-090). Excavated Hot Spot soils would be managed off site as a characteristic hazardous waste pursuant to Oregon Hazardous Waste Management Rules (OAR 340-100 through 120), or treated on site to meet Resource Conservation and Recovery Act (RCRA) toxicity characteristic for PCE. The ROD defined Hot Spot soils as 100 times the acceptable risk level for human exposure to each individual carcinogen or 10 times the acceptable risk level for each individual non-carcinogen.

Comparison of ROD-based numerical standards to 100 times current and applicable RBCs indicate that the ROD standards are more stringent. As such, changes in risk based criteria do not affect protectiveness.

6.3.1.2 OU2

RGs

Contaminant-specific standards used to set the RGs were compared to present day values to assess continued protectiveness of the remedies. RGs for COCs are based on Oregon Environmental Cleanup Rules (OAR 340-122-40(2)(a) which set the maximum acceptable risk levels of 1E-06 for individual carcinogens and/or HQ greater than 1 for non-carcinogens. These rules address:

1. Exposure of future on-site workers and off-site residents from direct contact, ingestion and/or inhalation.

2. Preventing migration of upper aquifer groundwater to off-site areas or deeper aquifers.

Comparison of RG numerical values to current and applicable RBCs for groundwater indicates that the RG values for PCE, TCE, and VC are not as stringent as current Risk Based Decision Making (RBDM) values. The difference between criteria is between about one and one and one half orders of magnitude. Since the original RGs were established based on potential cancer risk of 1E-06, the RGs would remain within the acceptable risk range established in the NCP even if current RBDM values were used, and thus RGs remain protective and no changes to the RGs are necessary.

Table 6-1. Comparison of RGs and RBCs for Groundwater

COCs	RG	RBCs
PCE	1.0 µg/L	0.093 µg/L
TCE	1.6 µg/L	0.039 µg/L
VC	1.0 µg/L	0.025 µg/L

An interim TCE toxicity value is being used by DEQ, because the toxicity of TCE is currently under review by EPA. DEQ has elected to continue to use estimated upper range of toxicity, with EPA findings anticipated in 2011 (DEQ 2009c).

Aquifer Restoration

The ROD also identified the Safe Drinking Water Act (SDWA)(40 CFR Part 141), which set the Maximum Contaminant Levels (MCLs) for the restoration of the upper aquifer as a drinking water source. No changes have been made to the MCLs.

6.4 DOCUMENT REVIEW

A list of relevant documents is displayed in Appendix B.

6.5 DATA REVIEW

This section presents a summary of data reviewed for OU1 and OU2.

6.5.1 OU1 Soil

6.5.1.1 Soil Contamination

Review of data and information summarized in the Contractors Focused Field Investigation Report (Parametrix 2009) and EPA Removal Action Report (EPA 2011b), and other listed documents in Section 6.4 indicated:

- Soil contamination in the form of coal tars and/or other DNAPL is present under the engineered soil cap. The general nature and extent of contamination in the vicinity of Former Plants 3 and 4 (Plume 1 Source Area) was characterized in the FFI. Location maps and cross sections describing the extent of the coal tar bodies can be found in Figures 6-1 and 6-2.
- Identified soil contamination exceeded industrial soil criteria for human health and leaching to drinking water criteria.
- The TCRA removed a majority of identified contaminated soil and disposed of non-hazardous soils offsite to an approved solid waste facility; 24,797 tons of contaminated soil was removed.
- Sidewall and bottom of excavation confirmation sampling indicated that residual contaminated soil is present outside of the excavation boundaries and below the bottom of the removal areas (< 25 feet). As shown in Figure 6-1, the majority of contamination encountered during the FFI was limited to 30 feet bgs and above. Contaminated soil exceeds leaching –to -groundwater criteria for chlorinated solvents in 37 of 56 confirmation samples.

- Removal areas were backfilled with an engineered soil amendment. The amendment has the ability to help treat residual soil contamination through biotic and abiotic reductive dechlorination.

6.5.1.2 Soil Cap and Associated Engineering Controls

- Following the TCRA and construction of the laydown yard, streetcar maintenance building and test track the integrity of the soil cap is being maintained though minor maintenance as required to ensure the prevention of future erosion.
- Vegetation on the soil cap is generally complete and well maintained. There were bare spots noted adjacent to the new rail and streetcar building due to heavy equipment operation. Ruts from heavy equipment in the southwest corner of the Site have also disturbed vegetation and exposed cap materials to erosion. Ponding occurs discretely sitewide. Some areas near OIW laydown yard and the rail and streetcar building have been re-graded, with culverts and/or a stormwater conveyance system installed, to address ponding issues.
- Fencing around the Site, required by the ROD, is in good condition.
- Access roads on the northern and southern entrances to Parcel B are in good condition.
- The appropriate warning signs on the north and south gate required by the ROD are posted and in good condition.

6.5.1.3 Wetlands

The wetland mitigation project was implemented at the Site in 2003 and had a 5- year period of performance which ended in 2008. Clackamas County is currently responsible for maintaining the wetland. Information contained in this section comes from the final wetland monitoring report for the Site (GeoEngineers 2008).

- Conditions observed at the wetland mitigation site found that all Year 3 (2006) and Year 4 (2007) performance criteria were met.
- The performance criteria for saturated soils for Year 5 (2008) of 80 percent native tree and shrub cover were met throughout the mitigation area. Total combined coverage of native plants was 100 percent in each emergent wetland plot and 90 percent in the forested wetland plots. No areas of bare ground were observed in the wetland or buffer areas.
- Efforts to control noxious and persistent nonnative species at the Site continue to keep overall percentage of these species low. Thistle, teasel, Himalayan blackberry, knapweed and tansy ragwort were nonnatives observed and removed.
- The floor of the wetland mitigation area was found to support saturated soils in the upper soil layer and/or support several inches of standing water during spring months each year of the 5-year monitoring period.
- Nonnative weed control efforts and manual watering should be continued within the wetland mitigation area on an as-needed basis. Clackamas County is currently responsible for all wetland maintenance and has been compliant with this requirement.

6.5.2 OU2 Groundwater

Review of data and information summarized in the sitewide groundwater monitoring reports and documents listed in Section 6.4 indicate the following conditions regarding the site hydrogeology and the nature and extent of groundwater contamination.

6.5.2.1 Hydrogeology

Hydrology at the Site, including flow direction and magnitude, is generally similar in all three WBZs. While gradients are the smallest in the Deep WBZ and greatest in the Shallow WBZ, the differences are less than an order of magnitude. Since flow direction and gradients in all three WBZs can be generally described by describing any one of the three zones, and since the Shallow WBZ exhibits the most impact by man-made activities, site hydrogeology will be discussed in terms of the Shallow WBZ (with noted exceptions).

Prior to June 2008, groundwater flow beneath the Site was not completely understood owing to a number of mounds and swales that were apparent on prepared groundwater elevation contour maps. As a result of continued difficulties with the creation of these maps, the Contractor proposed a resurvey of all measuring point elevations (MPEs) of monitoring wells on site. This sitewide resurvey (in which many significant errors in original MPEs were noted) was completed in June of 2008 and resulted in a correct and more complete understanding of groundwater flow directions on the Site.

Figure 6-3 displays groundwater elevations and flow directions for the Shallow WBZ in November 2008. Groundwater flow is generally to the north-northwest, with the highest groundwater elevations in the southwest corner of the Site. Equipotential lines extend generally laterally across the Site.

Figure 6-4 displays groundwater elevations and flow directions for the Shallow WBZ in November 2010. As in November 2008, groundwater flow is generally to the north-northwest. The highest groundwater elevations at the Site in November 2010 were located in the middle of Parcel B (MW-207, MW-04, and MW-208) roughly surrounding Removal Area 1. It appears that though the overall direction of groundwater flow is to the north-northwest, groundwater flows radially from this 'mound'. This change in groundwater flow conditions is likely a result of localized stormwater infiltration through the soil cap into the removal areas that contain porous soil amendment. A nonpermeable barrier was placed over Removal Area 1 to mitigate infiltration directly into the porous media in June 2010. Groundwater mounding in Figure 6-4 seems to be reduced in magnitude relative to November 2009 water levels, and it is likely that mitigation measures have reduced infiltration in the immediate area. This mounding is also apparent to a lesser extent in the Intermediate WBZ.

Vertical groundwater gradients across the Site are generally downward, with upward gradients localized and limited in magnitude. Downward gradients tend to be greater than upward gradients by an order of magnitude. Vertical gradients generally support the observed downward migration of contaminants along the axis of groundwater flow at the site.

6.5.2.2 Nature and Extent of Contamination

The ROD for OU2 identifies three VOCs as COCs: PCE, TCE, and VC (EPA 2001). As a result of the 2008 FFI, a number of other contaminants were identified as significant in extent and concentration and are now considered contaminants of potential concern (COPCs). These contaminants include cis 1,2-DCE (a breakdown product of PCE and TCE); and a number of components of coal tar including naphthalene, 2-methylnaphthalene, acenaphthene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, and pyrene. The

baseline risk assessment determined that these chemicals of potential concern (COPCs) did not pose an unacceptable risk to human health or ecological receptors. Therefore, these chemicals were not monitored during the implementation of the remedial action for the groundwater operable unit.

Initial efforts to delineate and treat impacted groundwater through the use of the GCWs led to the designation of four distinct plumes within the project area (Figure 6-5). In support of current efforts to monitor the effectiveness of the TCRA in 2009, groundwater impacts at the site are now described as being part of a single commingled plume. This simplification supports the achievement of sitewide RAOs through a single strategy.

As the most prevalent CVOC on site, PCE can be used as an accurate indicator compound for evaluating the extent of CVOCs on site. Analytical data from the November 2010 sitewide sampling event was used to describe the current extent of the CVOC plume on site and exceptions pertaining to particular compounds will be noted.

While the CVOCs may share source areas with the coal tar-related dissolved PAH plume, the latter are generally much more limited in extent. The descriptions of the extent of these compounds have relied on analytical results for naphthalene from both the 2008 FFI (sonic boring samples designated 'B') and the November 2008 sitewide sampling event. Monitoring well coverage limited the completeness of the November 2010 PAH data set, and as a result of few detections down gradient of the understood PAH plume and the relatively limited mobility of these compounds, the 2008 data is believed to be an accurate representation of current subsurface conditions (except where noted).

Figure 6-6 shows PCE concentrations in the Shallow WBZ for the November 2010 monitoring event. In general, the dissolved CVOC plume in the shallow zone is present throughout Parcels A and B extending from defined source areas in Parcel B northward in the direction of groundwater flow to its extent in the vicinity of Lawnfield Road. The highest concentration of PCE (1,300 µg/L) is found in the area near MW-213 in the eastern portion of Parcel B. Extent and magnitude of PCE in the shallow zone in 2010 is very similar to 2008 (previous sitewide event), with the important exception of a dramatic reduction in concentration in the immediate vicinity of Removal Area 1. In general, all CVOCs are similar in extent to 2008 with the above exception

Fifty-six confirmation samples were collected from the sidewalls and bottom of the excavations during the Fall 2009 TCRA. Thirty-two of those confirmation samples had detections of PCE, TCE or VC above ROD based cleanup goals. Two samples had concentrations of PCE over 30 mg/kg, though the remaining detections were at least an order of magnitude lower.

CVOC concentrations in the intermediate WBZ (Figure 6-7) are generally similar in extent with apparent movement vertically downward with downgradient movement. Concentrations in the intermediate zone are generally lower in magnitude. There have been moderate increases in cis 1,2-DCE concentrations in the Intermediate WBZ in the north-central portion of parcel B. These increases are downgradient of the Fall 2009 TCRA excavation area and are likely a product of soil amendment enhanced dechlorination. CVOCs in the deep WBZ (Figure 6-8) are generally limited to an area in the northeast quadrant of Parcel B.

As mentioned above, significant reductions in naphthalene and PAH concentrations are evident in the vicinity of Removal Area 1 and 2. Due to the low mobility of naphthalene and other PAHs, concentrations outside of the Removal Areas and in the Deep WBZ are likely similar to those in 2008 (based primarily on data from the FFI). Figures 6-9, 6-10, and 6-11 display 2008 concentrations in the shallow, intermediate, and deep WBZs, respectively. All three figures show a very similar extent in the central-eastern portion of Parcel B

Dechlorination and biological indicators observed since 2008 indicate that microbiological activity and resultant dechlorination increased significantly in the immediate vicinity of the TCRA (see Section 4.3) removal areas after the introduction of soil amendment (Table 6-2. Recent observations indicate a possible peak and decline in activity due to TCRA activities. These indications include declining concentrations of dissolved iron (a source of reducing conditions), methane (an indicator of anaerobic biological activity(methanogenesis)), chloride (an indicator that dechlorination is occurring), increasing redox potential (indicating conditions trending more toward oxidation), and an increase in sulfate (an inverse indicator of anaerobic biological activity(sulfate reduction)) concentrations. Additional monitoring will be necessary to determine long range trends.

Table 6-2. Dechlorination Parameters

Well ID	Sample Date	TOC	Iron	ORP	DO	Methane	Sulfate	Ethane	Ethene	Chloride
Units		mg/L	µg/L	mV	mg/L	µg/L	mg/L	µg/L	µg/L	mg/L
Shallow Water Bearing Zone										
CMT7-17	7/7/2010	7.36	4,670	-98	0.62	0.69 J	19	0.6 U	0.611 U	13.8
CMT7-17	11/10/2010	6.7	3,270	-51	0.5	10.7	25.7	1.01 U	0.893 U	12.5
MW-213	7/6/2010	5 U	1,180	-202	0.53	9.7	16.4	0.6 U	0.655 U	11.9
MW-213	11/10/2010	1.37	969	-117	0.31	4.46	12.1	1.01 U	0.893 U	10.8
MW-123	7/7/2010	5 U	293	-143	0.54	0.928 U	9	0.6 U	0.611 U	5.42
MW-123	11/8/2010	1.67	202	-50	0.38	1.59	11.3	1.01 U	0.893 U	5.37
MW-206	12/2/2009	1.67	330	30	0.73	1.58	14.2	0.1 U	0.1 U	5.02
MW-206	7/7/2010	5 U	275	-15	0.57	0.928 U	12.3	0.6 U	0.611 U	5.58
MW-206	11/11/2010	1.11	212	56	0.41	0.479	12.5	1.01 U	0.893 U	5.59
MW-207	12/2/2009	1,840	198,000	-37	0.22	6.32	25.6	0.1 U	0.1 U	50.1
MW-207	7/7/2010	99.5	72,200	NR	NR	690	0.3 U	0.6 U	0.611 U	19.5
MW-207	11/10/2010	9.21	76,900	NR	NR	144	719	1.01 U	0.893 U	10.2
MW-208	12/2/2009	7.19	277	-52	0.2	6.32	11.3	0.1 U	0.1 U	4.67
MW-208	7/6/2010	8.95	9,530	-191	0.36	44.3	0.647	0.6 U	0.655 U	29.1
MW-208	11/10/2010	3.32	2,290	-74	0.46	1.83	12.4	1.01 U	0.893 U	6.62
Intermediate Water Bearing Zone										
CMT7-40	7/7/2010	5 U	184	-106	0.68	0.928 U	7.2	0.6 U	0.611 U	9.39
CMT7-40	11/10/2010	1 U	194	-65	0.33	0.446	7.69	1.01 U	0.893 U	9.85
MW-124	7/7/2010	5 U	134	-77	0.54	1.38	10	0.6 U	0.611 U	5.73
MW-124	11/11/2010	1.37	100	-11	0.7	0.957	10.5	1.01 U	0.893 U	5.9
MW-129	7/6/2010	5 U	143	-142	0.65	1.38	5.82	0.6 U	0.611 U	14.8
MW-129	11/9/2010	2.12	103	-19	0.65	1.78	9.2	1.01 U	0.893 U	24.4
MW-18	12/2/2009	3.17	8,600	-39	0.73	4.22	12.4	0.1 U	0.1 U	3.32
MW-18	7/7/2010	5 U	2,910	-37	0.66	1.38	25	0.6 U	0.611 U	7.29
MW-18	11/10/2010	2.49	3,920	-14	0.73	5.85	42.6	1.01 U	0.893 U	6.71
MW-205	12/2/2009	1.24	60	-27	0.54	0.14 U	10.6	0.1 U	0.1 U	8.08
MW-205	7/6/2010	5 U	51	-50	0.58	0.928 U	10.5	0.6 U	0.611 U	8.9

Well ID	Sample Date	TOC	Iron	ORP	DO	Methane	Sulfate	Ethane	Ethene	Chloride
Units		mg/L	µg/L	mV	mg/L	µg/L	mg/L	µg/L	µg/L	mg/L
MW-205	11/11/2010	1 U	24	31	0.52	0.286 U	10	1.01 U	0.893 U	8.9
MW-209	12/2/2009	1 U	20 U	4	0.45	0.14 U	3.11	0.1 U	0.1 U	3.13
MW-209	7/6/2010	5 U	76	29	0.56	5.54	2.76	0.6 U	0.655 U	8.16
MW-209	11/10/2010	1 U	9.4	57	0.57	0.468	3.2	1.01 U	0.893 U	5.27
MW-214	7/6/2010	5 U	80	-154	0.38	0.935 U	5.19	0.6 U	0.655 U	3.95
MW-214	11/11/2010	1 U	160	-111	0.23	0.468	5.55	1.01 U	0.893 U	4.03

Notes:
mg/L = milligrams per liter NR = not recorded
mV = millivolts µg/L = micrograms per liter

6.6 SITE INSPECTION

A site inspection was conducted by the EPA Contractor Parametrix on March 24, 2011 (see site inspection checklist in Appendix C). The purpose of the inspection was to assess the protectiveness of the remedy through the reviews discussed below.

6.6.1 OU1 Soil

Inspection of the soil cap and engineering controls indicated:

- The cap remains vegetated with grass in most areas. Vegetation height ranged from 3 to 8 inches.
- Vehicle traffic was limited to roadways. Some potholes were observed.
- The soil cap appears to be in good condition. Some minor soil erosion and ruts from vehicles are apparent at the north gate due to vehicle traffic. Impacts from 2009 TCRA and construction of the OIW laydown yard and test track were mitigated for at the time and currently the cap is intact parcel wide.
- Surface water ponding was observed throughout Parcel B. Ponded water has occurred in shallow depressions up to 20 feet in diameter.
- Fencing and locked gates restrict access to Parcel B. The fencing appears to be in good condition. "No Trespassing"/"Hazardous Waste Site" signs are posted along the perimeter of the fence, and EPA/DEQ contact information is provided on signs posted on the north and south gates. The north gate is frequently unlocked and left open by OIW and/or their contractors during working hours.

6.6.2 OU2 Groundwater

As mentioned previously, the GCW treatment systems were shut down in 2007, an inspection of the inactive system indicated:

- Equipment sheds appeared to be in good physical condition. No leaks were observed. Safety signs displaying "Ear Protection Required" were posted. Some sheds displayed mouse and insect activity and loose nail heads along the structure.

- Treatment vaults appeared to be in fair condition. Some vaults showed signs of insect activity, standing water, and degradation of water-resistant grout along piping runs. Standing water in some vaults rises to levels above in-vault equipment and the wellhead. Sump pumps in the vaults are not operational.

The monitoring well network appears to be in good condition. Well heads, security monuments, and bollards are functioning as intended. Some older monitoring wells have monuments which are not securable or are missing monument lids.

6.7 INSTITUTIONAL CONTROLS

As part of the data review process public records were reviewed to determine whether ICs required by the ROD were recorded and being properly followed.

6.7.1 Parcel A

The western lot of parcel A, which is owned by ODOT, is required by the ROD to have ICs in place as part of the remedy for OU2. These ICs include groundwater use, access, land use and new construction restrictions; notice of transfer; and certain requirements on development of the property (including the Sunrise Corridor Project) ensuring remedial actions are not adversely affected. These ICs were put in place through an EES (DEQ and ODOT 2009). The EES also includes a right of entry clause. This EES was found to be in the public record at the Clackamas County Records Department. The provisions in the EES run with the property.

The eastern lot of parcel A, which is owned by NWDC, was not initially required by the ROD for OU2 to have ICs in place. As a result of the determination that the remedy was not functioning as intended (Parametrix 2006c) an ESD (EPA 2008) to the OU2 ROD was written requiring ICs be put in place on the eastern lot of parcel A to restrict groundwater use until cleanup levels are met. The ICs were put in place through an EES (DEQ and NWDC 2010). These ICs include groundwater use restrictions, notice of transfer, and certain requirements that development on the property not adversely affect the remedy. The EES also includes a right of entry clause. This EES was found to be in the public record at the Clackamas County Records Department. The provisions in the EES run with the property.

All ICs in place for parcel A are being adhered to. There is no use of groundwater occurring on either ODOT or NWDC property and plans for development of the ODOT property have included EPA and DEQ review.

No liens against the properties were noticed.

6.7.2 Parcel B

ICs for parcel B were required to be put in place by the RODs for OU1 and OU2. With the transfer of the property to CCDA in October 2005 the ICs were documented in an EES (DEQ and CCDA 2005). The ICs include restrictions to groundwater use, soil cap use, wetland use, access, land use, construction and development as well as provisions for notice of transfer and right of entry. This EES was found to be in the public record at the Clackamas County Records Department. The provisions in the EES run with the property.

All ICs for parcel B are being adhered to. There is no use of groundwater on parcel B and construction and development associated with the OIW laydown yard and test track have included vapor intrusion testing and controls and have used practices that do not interfere with remedial activities on site or jeopardized the functionality of the soil cap or wetland as required in the EES.

In addition to the EES for parcel B, during the records search the Prospective Purchaser Agreement between DEQ and CCDA and the Memorandum of Lien Waiver between EPA and CCDA were noticed. No liens against the property were identified.

6.8 INTERVIEWS

A summary of interviews is presented in Appendix D. Telephone interviews were conducted with parties identified based on the following criteria:

- On-site property owners, and
- Public entities affected by operation of the remedy.

Parties identified and interviewed included:

- Deborah Bailey, Project Manager, Oregon Department of Environmental Quality;
- Ken Itel, Manager, Clackamas County Development Agency;
- Mark La Noue, President, La Noue Development & Brokerage (owner of NWDC property);
- Tara Aarnio, General Counsel, Oregon Iron Works;
- Brian McNamara, Hydrogeologist, Oregon Department of Transportation; and
- Bobby Walker, Facility Manager, Oregon Department of Transportation.

Parties were asked the following questions:

- Role and responsibilities?
- Have EPA and its contractors kept you informed and have they supplied appropriate levels of information regarding site activities?
- Are there any duties EPA and/or contractors have not fulfilled?
- Do the remedial actions coincide with the objectives of the State, County, or private entity?
- Do you have any concerns regarding the Site?
- Are there any new developments, either constructed or planned, in the area that the agency is unaware of? Construction permits pending or submitted?
- What follow-up actions should be taken?

In general, parties indicated that they were well informed, and a good line of communication existed between them and the EPA RPM. However, Deborah Bailey, DEQ, listed her concerns for updating the State-EPA Superfund contract; and demonstrating that monitored natural attenuation (MNA) is a viable component of the groundwater remedy.

7. TECHNICAL ASSESSMENT

This section presents an assessment of the remedy's performance as implemented at Northwest Pipe and Casing, using a framework of three questions in accordance with the Five Year Review Guidance. Sections 7.1.1 through 7.1.4 address OU1, which focuses on Site soils. Sections 7.2.1 through 7.2.4. address OU2, which focuses on Site groundwater.

7.1 SOIL - OU 1

7.1.1 QUESTION A: IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENT?

Yes. The soil cap and IC components of the remedy for OU1 (soils) are functioning as intended to prevent direct contact exposure, and the actions taken to date including treatment or removal of the majority of contaminated soils and capping are believed to be sufficient to prevent migration of significant levels of COCs to groundwater.

Technical assessment of the remedy indicates that:

- The remedy has been successful in treating, removing, or disposing of approximately 32,310 tons of contaminated soil from the Site as part of the remedial action and an additional 24,757 tons of contaminated soil was disposed off site during the 2009 TCRA.
- The remedy provides an effective means through ICs and the soil cap to limit potential direct exposure of current/future workers and trespassers to underlying contaminated soil.
- The implementation of the remedy was conducted in an effective manner.
- The soil cap, as modified by activities, including the TCRA, construction of the laydown yard, test track and related buildings, is in good condition and receives the necessary monitoring, inspection and maintenance. Clackamas County inspects the cap biannually and submits a report on the condition to EPA and ODEQ.
- Actual OU1 project costs for remedial action work, soil cap placement, and wetland restoration were less than costs estimated by the ROD but additional costs were incurred under the TCRA.
- The wetland is functioning as intended and meets the required criteria.
- ICs for OU1 have been implemented, are currently being adhered to and are functioning as intended. No changes to or additional soil ICs are necessary.

The remedy for OU1 is currently achieving the RAOs specified in the ROD. Each RAO is presented below in italics, followed by a discussion of how the remedy is functioning with respect to the intent of the RAO.

Prevent exposure of trespassers, future construction workers, and future maintenance workers through direct contact (ingestion or dermal contact) with contaminated soil that would result in an excess lifetime cancer risk greater than one in a million for individual carcinogens, above one in one hundred thousand for additive carcinogenic contaminants, or above a Hazard Quotient of 1.

The remedy satisfies the intended function of the RAO.

- Exposure to future construction workers through direct contact is limited by the soil cap and the EES for the CCDA property, which specifies ICs including adherence to the Soil Cap Monitoring and Maintenance Plan (DEQ and EPA 2005) and the Waste Management Plan (EPA 2005). These plans provide conditions and requirements for maintaining and inspecting the soil cap and for future work activities that disturb the cap, respectively. The ICs in place remain necessary and appropriate to ensure humans are not exposed to contaminated soil remaining on site.
- Approximately 32,010 tons of known contaminated soil and debris was excavated (removal areas noted on Figure 6-4), of which approximately 10,463 tons were disposed of at a Subtitle C Landfill in Arlington, Oregon. Approximately 7,479 tons of soil was thermally treated off site and then reused as backfill on site, and approximately 5,466 tons of debris and oversized material was disposed at a Subtitle D landfill in Hillsboro, Oregon.
- Contaminated soil remaining in place is covered by the protective soil cap.
- Exposure to trespassers and future construction and maintenance workers through direct contact is prevented through placement of a clean 2-foot soil cap covering contaminated soils on Parcel B. Inspection and maintenance activities are performed to ensure the soil cap integrity is maintained.
- Exposure to trespassers through direct contact of contaminated soils is further prevented by fully enclosed fencing and warning signs which inhibit access to the Site.

Prevent migration of soil contaminants to groundwater that would result in exposure to future off-site residents through direct contact (ingestion, inhalation, and dermal contact) with contaminated groundwater that would result in an excess lifetime cancer risk greater than one in a million (1E-06) for individual carcinogens, above one in one hundred thousand for additive carcinogenic contaminants, or above a Hazard Quotient of 1.

The remedy satisfies the intended function of the RAO.

- The ROD established RGs for TCE, PCE, and VC in soil at levels which are protective of the groundwater MCLs. Migration of soil contaminants to groundwater was substantially reduced at the Site through treatment or removal of a majority of contaminated soils which exceeded the soil RGs for these contaminants during both the initial RA and the 2009 TCRA.
- Migration of soil contaminants to groundwater was further reduced through the placement of a clean 2-foot-thick soil cap over the remaining lesser contaminated soils. Soil cap material which was removed during the 2009 TCRA was replaced once the excavation was filled.

Wetland

The wetland has met the performance criteria established in the Wetland Mitigation and Monitoring/Maintenance Plan (URS 2003c) during the performance period between 2003 and 2008. Although monitoring of the wetland is no longer required, CCDA has taken responsibility for maintaining the wetland including watering and invasive plant removal when needed. CCDA's commitment to take on this activity is found in the EES and PPA with DEQ.

7.1.2 QUESTION B: ARE THE EXPOSURE ASSUMPTIONS, TOXICITY DATA, CLEANUP LEVELS, AND REMEDIAL ACTION OBJECTIVES USED AT THE TIME OF THE REMEDY SELECTION STILL VALID?

Yes. Land use assumptions and RAOs used at the time of the remedy selection remain valid. Though some land use changes have occurred on Parcel B, the uses remain consistent with the assumption of industrial use of the site and the ICs in place are working to prevent potential exposure and ensure continued protectiveness. The cleanup levels in the ROD for VOCs in soil are based on attaining MCLs for these VOCs in groundwater. For all COCs except TCE the slope factor and reference doses have not changed. However, the cancer slope factor for TCE is under review, and the impact of any final change by EPA in the slope factor will need to be evaluated.

There have been no changes in federal or state standards or regulations which were cited as ARARs in the ROD that could affect the protectiveness of the remedy.

7.1.3 QUESTION C: HAS ANY OTHER INFORMATION COME TO LIGHT THAT COULD CALL INTO QUESTION THE PROTECTIVENES OF THE REMEDY?

No. There have been no changes to the physical condition of the Site that have affected the protectiveness of the remedy. Physical changes to Parcel B, including the construction of the OIW laydown yard and streetcar test track, are not believed to have affected the protectiveness of the remedy in the short term. It is unknown whether future land use changes (including the future construction of the Sunrise Corridor through the Site) will affect the protectiveness of the remedy. Development activities on Parcel B are required to be reviewed and approved by DEQ and EPA under the terms of an Easement and Equitable Servitude recorded with the property deed in 2005.

7.1.4 TECHNICAL ASSESSMENT SUMMARY

The soil cap and IC components of the remedy for OU1 (soils) are functioning as intended to prevent direct contact exposure, and the actions taken to date including treatment or removal of the majority of contaminated soils and capping are believed to be sufficient to prevent migration of significant levels of COCs to groundwater. The exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection remain valid and no other information has come to light that could call into question the protectiveness of the remedy. The following issue identified in this review requires follow-up action in the foreseeable future:

- Under-documented potential source areas and residual contamination documented during the TCRA exist on Parcel B which may be contributing to continuing leaching of chlorinated solvents to groundwater.

Two other potential issues were identified that could require follow-up in the future, though no follow-up is necessary at this time:

- The cancer slope factor for TCE is still under review by EPA, and if EPA changes the slope factor to a more conservative value the remedies and cleanup levels at this site will need to be re-evaluated.
- Work related to future land use changes (including the Sunrise Corridor) may encounter contaminants during construction activities such that compliance with IC requirements will need to be monitored closely.

7.2 GROUNDWATER OU2

7.2.1 QUESTION A: IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENT?

No. The IC components of the remedy for OU2 (groundwater) are functioning as intended to prevent human exposure to contaminated groundwater, however the GCW component of the remedy was not functioning as intended and has been discontinued. Additional investigations and a TCRA were done to remove significant residual contamination and introduce soil amendments to accelerate attenuation of remaining contaminants in soil and in groundwater and make progress toward the remaining RAOs.

Each RAO is presented below in italics, followed by a discussion of how the remedy is functioning with respect to the intent of the RAO.

Prevent exposure of future off-site residents and future on-site maintenance workers from direct contact (ingestion, dermal contact, and inhalation) to contaminated upper aquifer groundwater that would result in an excess lifetime cancer risk greater than one in a million for individual carcinogens, above one in one hundred thousand for additive carcinogenic contaminants, or above a Hazard Quotient of 1.0. The remedial goals (RGs) are the Oregon Environmental Cleanup Rules for drinking water, risk-based cleanup option:

- 1 µg/L for PCE
- 1.6 µg/L for TCE
- 1 µg/L for VC

This RAO is considered to be satisfied in the short term. Even though there have been detections of COCs in off-site wells (north of Lawnfield Road on the KEX property) just above respective RGs, it is unlikely that potential receptors have been affected. ICs have been implemented and remain necessary and appropriate are currently being adhered to and are functioning as intended. No changes to or additional groundwater ICs are necessary. The removal of contaminated soil and the introduction of soil amendment during the TCRA has greatly reduced COC concentrations in groundwater in the vicinity of the removal and dechlorination indicators point toward continuing breakdown of COCs as a result.

Prevent migration of upper aquifer groundwater to off-site areas or deeper aquifers with contaminant concentrations that would result in an excess lifetime cancer risk greater than one in a million for individual carcinogens, above one in one hundred thousand for additive carcinogenic contaminants, or above a Hazard Quotient of 1.

EPA is currently updating the Human Health Risk Assessment for the site. Once the Risk Assessment is complete, the status of the above RAO will be evaluated.

Restore use of the upper aquifer groundwater as a drinking water source. The goals for restoration are the federal and state safe drinking water standards (MCLs):

- 5 µg/L for PCE
- 5 µg/L for TCE
- 2 µg/L for VC

This RAO is not yet satisfied. Groundwater concentrations in the upper aquifer throughout the site exceed the above criteria. The removal of source material and introduction of soil amendment intended to accelerate attenuation processes during the 2009 TCRA may allow

currently stable or declining CVOC concentrations to begin to decline or decline more rapidly. Increases in breakdown products (cis 1,2-DCE and VC) in the shallow and intermediate WBZs point to increased dechlorination. Natural attenuation parameters should continue to be evaluated to determine whether enhanced biodegradation at the site could achieve the above RAO in the ROD established restoration timeframe (50 years or more).

7.2.2 QUESTION B: ARE THE EXPOSURE ASSUMPTIONS, TOXICITY DATA, CLEANUP LEVELS, AND REMEDIAL ACTION OBJECTIVES USED AT THE TIME OF THE REMEDY SELECTION STILL VALID?

Yes. Land use assumptions and RAOs used at the time of the remedy selection remain valid. Though land use changes have occurred on Parcel B, the ICs in place prevent any change in potential exposure. The cleanup levels set in the ROD for VOCs in groundwater were selected to correspond to an excess lifetime cancer risk of 1 X 10^{-06} from direct contact and ingestion of groundwater, are more stringent than the MCLs, and are protective of groundwater used in the future for drinking water by an off-site resident (see Section 7.2).

For all COCs the slope factors and reference doses used by EPA have not changed. As discussed in Section 6.3.1.2 a comparison of RG numerical values to current and applicable RBCs for groundwater indicates that the RG values for PCE, TCE, and VC are not as stringent as Oregon's current Risk Based Decision Making (RBDM) values. The difference between criteria is between about one and one-and-one-half orders of magnitude. Since the original RGs were established based on potential cancer risk of 1X 10^{-06}, the RGs would remain within the acceptable risk range established in the NCP even if current RBDM values were used, and thus they remain protective and no changes to the RGs are necessary.

There have been no changes in federal or state standards or regulations which were cited as ARARs in the ROD that could affect the protectiveness of the remedy.

7.2.3 QUESTION C: HAS ANY OTHER INFORMATION COME TO LIGHT THAT COULD CALL INTO QUESTION THE PROTECTIVENESS OF THE REMEDY?

No. There is no other information that calls into question the protectiveness of the remedy. Changes in land use at the site have been determined to be in compliance with established ICs and therefore do not impact the remedy.

7.2.4 TECHNICAL ASSESSMENT SUMMARY

The IC components of the remedy for OU2 (groundwater) are functioning as intended to prevent human exposure to contaminated groundwater, however the GCW component of the remedy was not functioning as intended and has been discontinued. Additional investigations and a TCRA were done to remove significant residual contamination and introduce soil amendments to accelerate attenuation of remaining contaminants in soil and in groundwater. The toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection remain valid, however the conceptual site model has been revised and exposure pathways/assumptions are being revised based on the additional work that has been done and post-removal monitoring may lead to further changes. The following issue identified in this review requires a follow-up action in the foreseeable future:

- The GCW component of the remedy was not functioning as intended and has been discontinued, and it is not yet known whether the additional removal and soil amendments will adequately accelerate attenuation of remaining contaminants in soil and in groundwater so as to achieve OU2 RAOs in a reasonable timeframe.

Another potential issue was identified that could require follow-up in the future, though no follow-up is necessary at this time:

- The cancer slope factor for TCE is still under review by EPA, and if EPA changes the slope factor to a more conservative value the remedies and cleanup levels at this site will need to be re-evaluated.

8. ISSUES

This section presents issues identified in this Five-Year Review which affect or could affect the protectiveness of the remedy.

Table 8-1. Issues for OU1

Issue	Affects Current Protectiveness (Yes or No)	Affects Future Protectiveness (Yes or No)
Residual contamination documented during the TCRA may exist on Parcel B, contributing to continuing leaching of chlorinated solvents to groundwater.	No	Yes

Table 8-2. Issues for OU2

Issue	Affects Current Protectiveness (Yes or No)	Affects Future Protectiveness (Yes or No)
The GCW component of the remedy was not functioning as intended and has been discontinued. It is not yet known whether the additional removal and soil amendments will adequately accelerate attenuation of remaining contaminants in soil and in groundwater so as to achieve groundwater RAOs in a reasonable timeframe.	No	Yes

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9. RECOMMENDATIONS & FOLLOW-UP ACTIONS

This section presents issues identified in this Five-Year Review.

Table 9-1. Recommendations for OU1

Issue	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes or No)	
					Current	Future
Residual contamination documented during the TCRA may exist on Parcel B, contributing to continuing leaching of chlorinated solvents to groundwater.	Continue sitewide groundwater monitoring to ensure concentrations of chlorinated solvents are not increasing in the vicinity of known or potential source areas.	EPA	EPA	November 2011	No	Yes

Table 9-2. Recommendations for OU2

Issue	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes or No)	
					Current	Future
The GCW component of the remedy was not functioning as intended and has been shutdown. It is not yet known whether the TCRA with the addition of soil amendments will adequately accelerate attenuation of remaining contaminants to achieve groundwater RAOs in a reasonable timeframe.	Potentially complete supplemental Risk Assessment and Feasibility Study to determine what changes need to be made to the selected remedy to achieve RAOs for OU2	EPA	EPA	November 30, 2012	No	Yes

Issue	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes or No)	
					Current	Future
The GCW component of the remedy was not functioning as intended and has been shutdown. It is not yet known whether the TCRA with the addition of soil amendments will adequately accelerate attenuation of remaining contaminants to achieve groundwater RAOs in a reasonable timeframe..	An ESD or ROD amendment should be completed to address RAOs for OU2.	EPA	EPA	December 2013	No	Yes

10. PROTECTIVENESS STATEMENTS

10.1 OPERABLE UNIT 1—SOIL

The remedy for OU1 currently protects human health and the environment and exposure pathways that could result in unacceptable risks are being controlled, however in order to ensure the remedy remains protective for the long term, sitewide groundwater monitoring needs to continue and results need to be evaluated to ensure concentrations of chlorinated solvents are not increasing in the vicinity of known or potential source areas.

10.2 OPERABLE UNIT 2—GROUNDWATER

The remedy for OU2 currently protects human health and the environment because groundwater exposure pathways are currently incomplete and ICs are in place to restrict beneficial use and prevent consumption of contaminated groundwater on Parcels A and B. However, in order for the groundwater remedy to remain protective in the long term, these follow-up actions identified in Section 9 need to be performed:

- Complete supplemental Risk Assessment and Feasibility Study to determine what changes need to be made to the selected remedy to address to achieve RAOs for OU2; and
- Modify the selected remedy accordingly and then implement as necessary.

10.3 SITEWIDE

The Site is currently protective of human health and the environment because of the ICs and other actions that have been implemented at this Site. However, in order for the Site to remain protective for the long term, sitewide groundwater monitoring should continue to ensure concentrations of chlorinated solvents are not increasing. Potentially a supplemental risk assessment and a focused feasibility study for groundwater may need to be completed and the remedy should be modified to address RAOs for OU2.

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11. NEXT REVIEW

The next Five-Year Review for NWPC is required by August 1, 2016, five years from this review date.

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12. REFERENCES

Clackamas County, FHA, and ODOT. 2010. Final Environmental Impact Statement, Sunrise Project, I-205 to Rock Creek Junction. December 2010.

CCDA and DEQ. 2005. Easement and Equitable Servitude between Clackamas County Development Agency and Oregon Department of Environmental Quality. October 6, 2005.

DEQ. 1987. Preliminary Assessment, Northwest Pipe and Casing. September 1987.

DEQ. 2009a. Letter to EPA concurring with decision to implement Time Critical Removal Action. July 20, 2009.

DEQ. 2009b. Risk Based Concentrations for Individual Chemicals. Oregon Department of Environmental Quality, Land Quality Division. September 15, 2009.

DEQ. 2009c. Interim TCE Toxicity Values used in DEQ's RBC spreadsheet. Prepared by the Oregon Department of Environmental Quality. September 15, 2009.

DEQ and CCDA. 2005. Easement and Equitable Servitude. October 6, 2005.

DEQ and EPA. 2005. Soil Cap Monitoring and Maintenance Plan. August 31, 2005.

DEQ and NWDC. 2010. Easement and Equitable Servitude. September 30, 2010.

DEQ and ODOT. 2009. Easement and Equitable Servitude. August 19, 2009.

E&E. 1988. Site Inspection Report, Northwest Pipe and Casing, Clackamas, Oregon. Prepared for US Environmental Protection Agency by Ecology and Environment, Inc. December 2, 1988.

E&E. 1990. Listing Site Inspection Report, Northwest Pipe and Casing, Clackamas, Oregon. Prepared for US Environmental Protection Agency by Ecology and Environment, Inc. June 14, 1990.

EPA. 1986. Guidelines of Ground-Water Classification, Final Draft. December 1986.

EPA. 2000. Record of Decision, Operable Unit 1, Northwest Pipe and Casing. June 2000.

EPA. 2001. Record of Decision Operable Unit 2, Northwest Pipe and Casing. September 2001.

EPA. 2004. Explanation of Significant Differences – Operable Unit 1, Northwest Pipe and Casing/Hall Process Company, Clackamas County Oregon. March 23, 2004.

EPA. 2005. Waste Management Plan, Northwest Pipe and Casing/Hall Process Company, Clackamas County, Oregon.

EPA. 2008. Explanation of Significant Differences – Operable Unit 2, Northwest Pipe and Casing/Hall Process Company, Clackamas County Oregon. December 18, 2008.

EPA. 2009. Memorandum: Approval and Funding of a Time Critical Removal Action ant the Northwest Pipe and Casing/Hall Processing Company Site (NWPC Site) and Request for a 2 Million Dollar Exemption. Prepared by U.S. Environmental Protection Agency, Region 10 Emergency Response Unit. July 28, 2009.

EPA. 2010. Amendment to Removal Action Memorandum. Prepared by U.S. Environmental Protection Agency, Region 10 Emergency Response Unit. May 27, 2010.

EPA. 2011. Removal Action Report for Northwest Pipe and Casing, Clackamas, Oregon. May 2011.

GeoEngineers. 2008. Wetland Monitoring Report for Monitoring Year 5 of 5 (2008), Northwest Pipe and Casing, Operable Unite 1 – Soil Cap Remedial Action, Clackamas, Oregon. Prepared for ODEQ. August 21, 2008.

GeoTrans 2007. Report of the Remediation System Evaluation Site Visit Conducted at the Northwest Pipe and Casing Site May 9, 2007. Prepared for U.S. Environmental Protection Agency. September 27, 2007.

Harper et al. 2010. Harper Houf Peterson Righellis, Inc. Proposed Grading Site Plan, Oregon Iron Works Phase II. February 11, 2010.

Parametrix. 2006a. Final Site Wide Groundwater Monitoring Report, November 2005. Prepared for US Environmental Protection Agency by Parametrix. April 12, 2006.

Parametrix 2006b. GCW-08 Performance Evaluation, Northwest Pipe and Casing/ Hall Process Company Superfund Site, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency. July 25, 2006.

Parametrix 2006c. Five-Year Review Report, Northwest Pipe and Casing, ORD 980988307, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency. October 2, 2006.

Parametrix. 2007. Final Sitewide Groundwater Monitoring Report – November 2006, Northwest Pipe and Casing Site, Operable Unit 2 - Groundwater. Prepared for U.S. Environmental Protection Agency, Seattle, WA. March 13, 2007.

Parametrix 2008. Sitewide Groundwater Monitoring Report, Northwest Pipe and Casing, November 2007 through June 2008. Prepared for U.S. Environmental Protection Agency, Seattle, WA. July 28, 2008.

Parametrix 2009. Focused Field Investigation, Fall 2008, Northwest Pipe and Casing/ Hall Process Company Superfund Site, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency, Seattle, WA. February 23, 2009.

Parametrix 2010. Summary of the November 2008 Groundwater Sampling Event Technical Memorandum, Northwest Pipe and Casing/ Hall Process Company Superfund Site, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency, Seattle, WA. March 25, 2010.

Parametrix 2011. 2010 Site Wide Monitoring Report, Northwest Pipe and Casing, Clackamas, Oregon. Prepared for the U.S. Environmental Protection Agency, Seattle, WA. March 2011.

URS and CH2M Hill. 1999. Final Feasibility Study, Northwest Pipe and Casing/Hall Process Company. Prepared for the US Environmental Protection Agency by URS Greiner in association with CH2M Hill. August 1999.

URS. 2002a. Interim Remedial Action Report, Northwest Pipe and Casing/Hall Process Company Superfund Site Operable Unit 1. Prepared for US Environmental Protection Agency. March 2002.

URS. 2002b. Addendum #1 to the Interim Remedial Action Report, Northwest Pipe and Casing/Hall Process Company Superfund Site Soil Operable Unit (OU 1). Prepared for US Environmental Protection Agency. June 2002.

URS. 2003a. Final Basis of Design Report. Northwest Pipe and Casing/Hall Process Company Soil Cap Remedial Design. Prepared for US Environmental Protection Agency. March 2003.

URS. 2003b. Wetland Mitigation and Monitoring/Maintenance Plan. Prepared for US Environmental Protection Agency. July 2003.

URS. 2003c. Wetland Mitigation and Monitoring/Maintenance Plan; Northwest Pipe and Casing Operable Unit 1 Soil Cap Remedial Action. Prepared for U.S. Environmental Protection Agency. 2003.

URS. 2004. Final Technical Memorandum, Baseline Groundwater Monitoring, Groundwater Circulation Well Performance Testing & Monitoring, and Vapor Treatment System Monitoring, Northwest Pipe and Casing Groundwater Operable Unit 2 Remedial Action. Prepared for US Environmental Protection Agency. April 2004.

Weston. 1998a. Remedial Investigation Report, Northwest Pipe and Casing/Hall Process Company. Prepared for US Environmental Protection Agency. August 1998.

Weston. 1998b. Human Health Risk Assessment Technical Memorandum – Contaminants of Concern/Exposure Assessment, Northwest Pipe and Casing. Prepared for US Environmental Protection Agency. January 27 1998.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

OFFICE OF
REGIONAL
COUNSEL

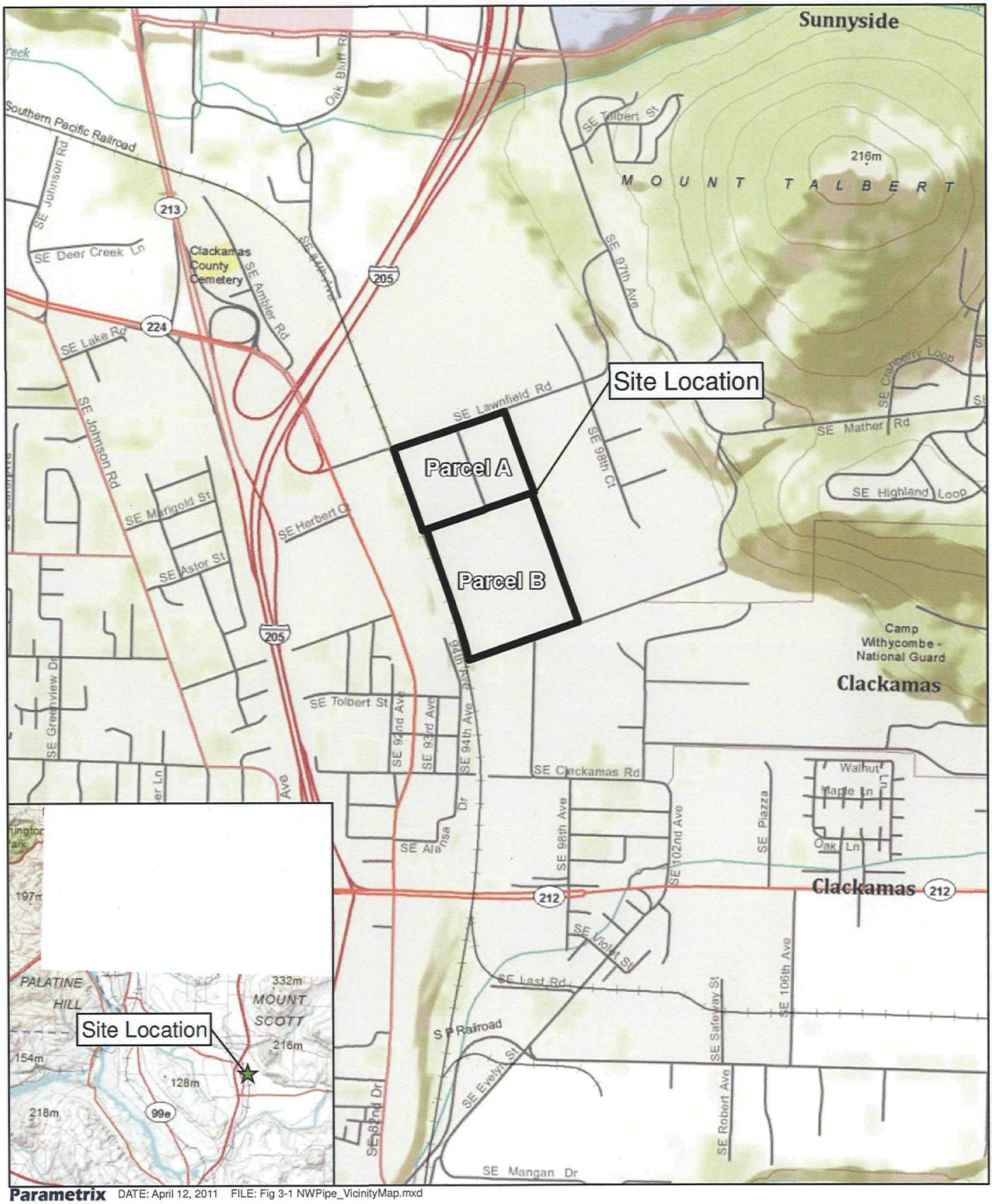
CERTIFICATION

I, Allyn L. Stern, certify that I am the Regional Counsel of the U.S. Environmental Protection Agency, Region 10; that I have duties in Seattle, Washington; and that the official whose signature appears herein has legal custody pursuant to 40 C.F.R. §2.406 of the original documents of which copies are attached, as witnessed by my signature and the official seal of the Environmental Protection Agency which appear below.

_____
Allyn L. Stern
Regional Counsel

_____
Date

FIGURES



Parametrix DATE: April 12, 2011 FILE: Fig 3-1 NWPipe_VicinityMap.mxd

Figure 3-1
Site Location Map

Second Five Year Review Report
Northwest Pipe and Casing
Clackamas, Oregon

DATE: April 20, 2011 FILE: Fig 3-2 NW_Pipe_Casing_Isoconcentrations.mxd

N

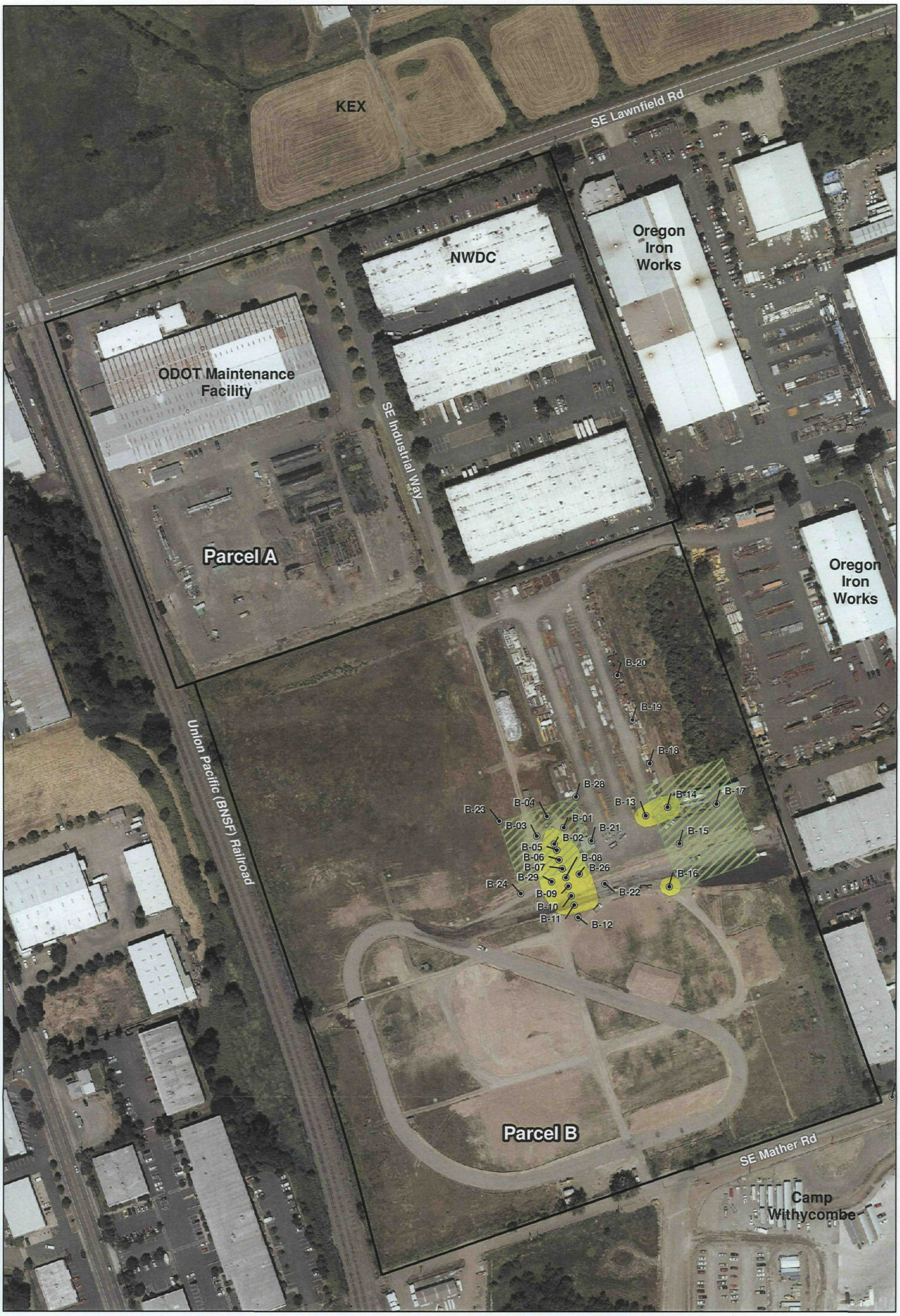
0 100 200

Scale in Feet

Future Sunrise Corridor

Figure 3-2
Current and Future Land Use

Second Five Year Review Report
Northwest Pipe and Casing
Clackamas, Oregon



DATE: April 20, 2011 FILE: Fig 3-3 NW_Pipe_Casing_Isoconcentrations.mxd

N

0 100 200

Scale in Feet

- Test Boring Location
- Historic Plants 3 and 4
- Coal Tar Body

Figure 3-3
Focused Field Investigation
Test Boring Locations and Features of Concern

Second Five Year Review Report
Northwest Pipe and Casing
Clackamas, Oregon

Parametrix Date: September 2011 File: Fig 3-4 PCE 2008 sh.mxd

N

0 100 200 300

Scale in Feet

- Boring
- CMT Well
- Shallow Piezometer
- Shallow WBZ Well
- Isoconcentration Line µg/L

Figure 3-4
PCE Isoconcentration Map
November 2008
Shallow WBZ

Second Five Year Review Report
NW Pipe and Casing
Clackamas, Oregon

Parametrix Date: September 2011 File: Fig 3-5 PCE 2008 int.mxd.mxd

N

0 100 200 300

Scale in Feet

- Boring
- CMT Well
- Intermediate Piezometer
- Intermediate WBZ Well
- Isoconcentration Line µg/L

Figure 3-5
PCE Isoconcentration Map
November 2008
Intermediate WBZ

Second Five Year Review Report
NW Pipe and Casing
Clackamas, Oregon

Parametrix Date: September 2011 File: Fig 3-6 PCE 2008 dp.mxd

N

0 100 200 300

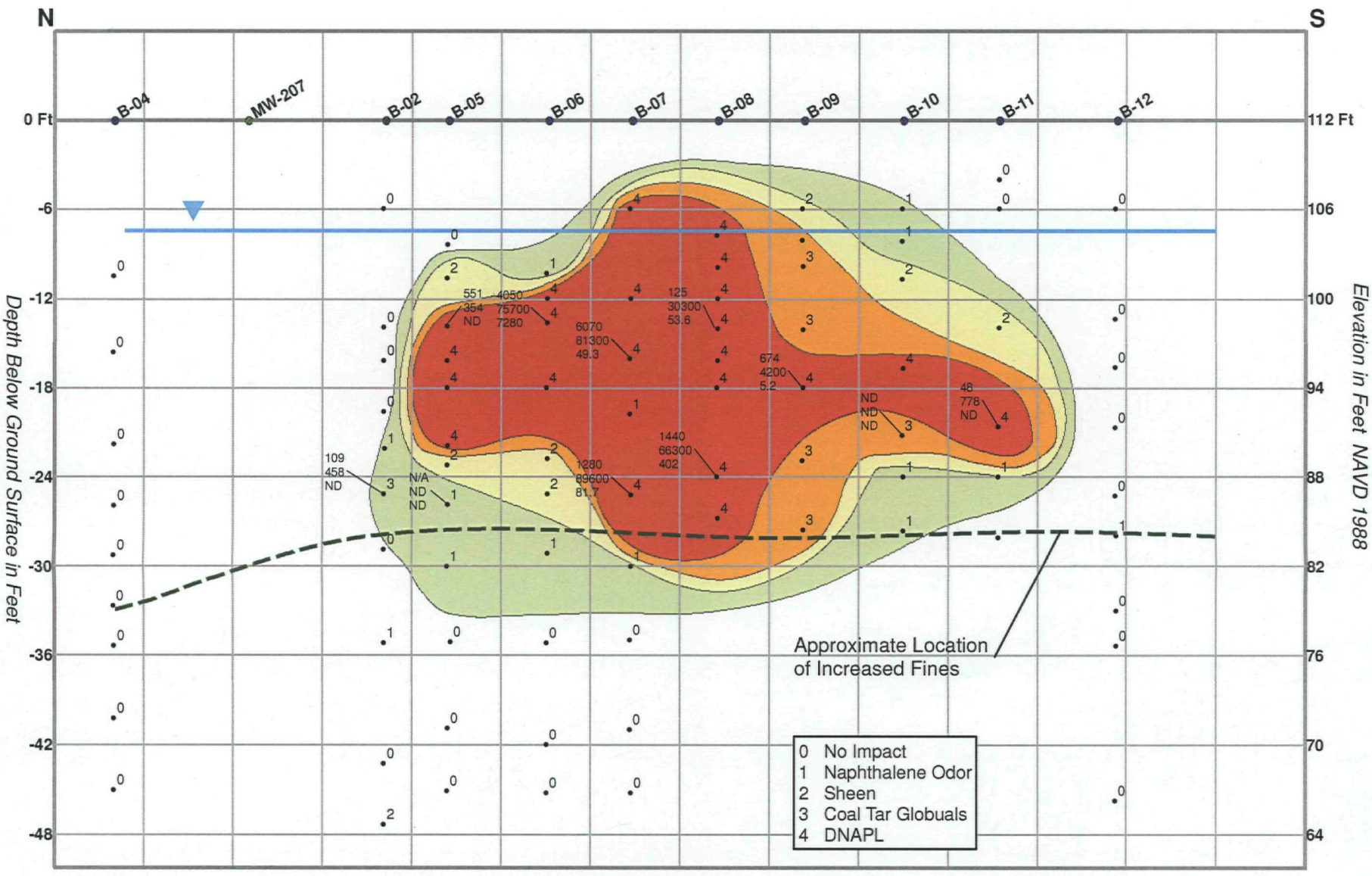
Scale in Feet

● Boring ◒ Deep WBZ Well

▲ CMT Well — Isoconcentration Line µg/L

Figure 3-6
PCE Isoconcentration Map
November 2008
Deep WBZ

Second Five Year Review
NW Pipe and Casing
Clackamas, Oregon



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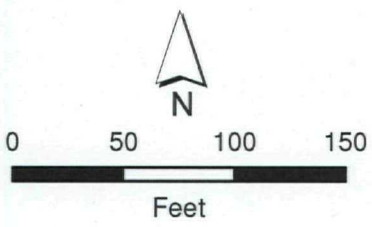


Sonic Boring

Existing Monitoring Well

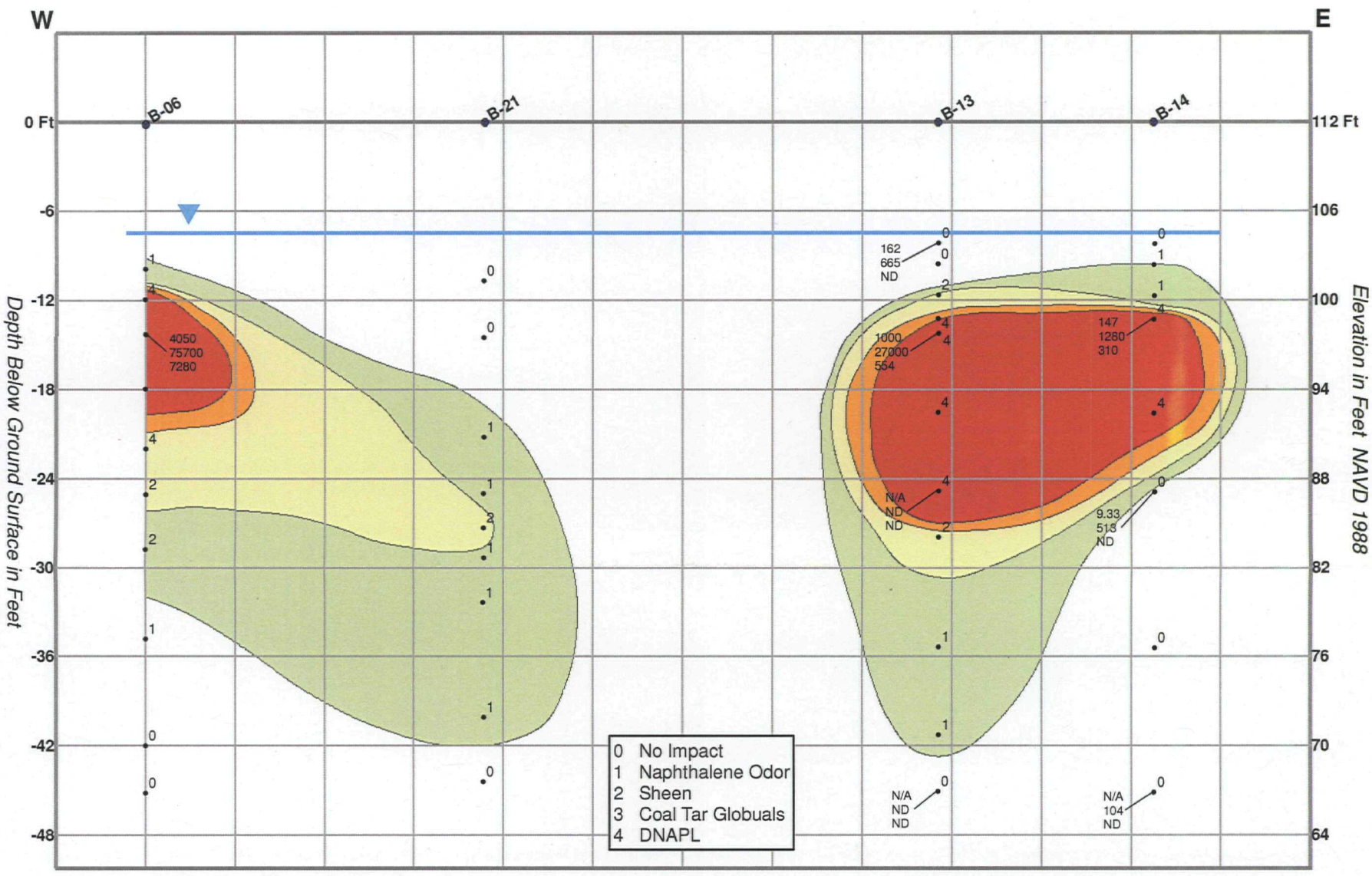
Coal Tar Body

Analytical Conc. in ug/kg

1000 Benzo(a)pyrene
27000 Naphthalene
554 PCE

Figure 6-1
Coal Tar Body 1
Location Map and
Cross Section

Second Five Year Review Report
Northwest Pipe and Casing
Clackamas, Oregon



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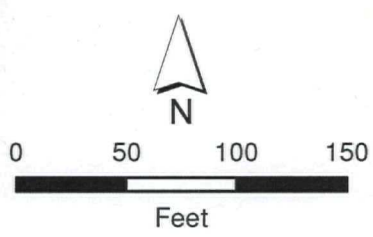


Sonic Boring

Existing Monitoring Well

Coal Tar Body

Analytical Conc. in ug/kg

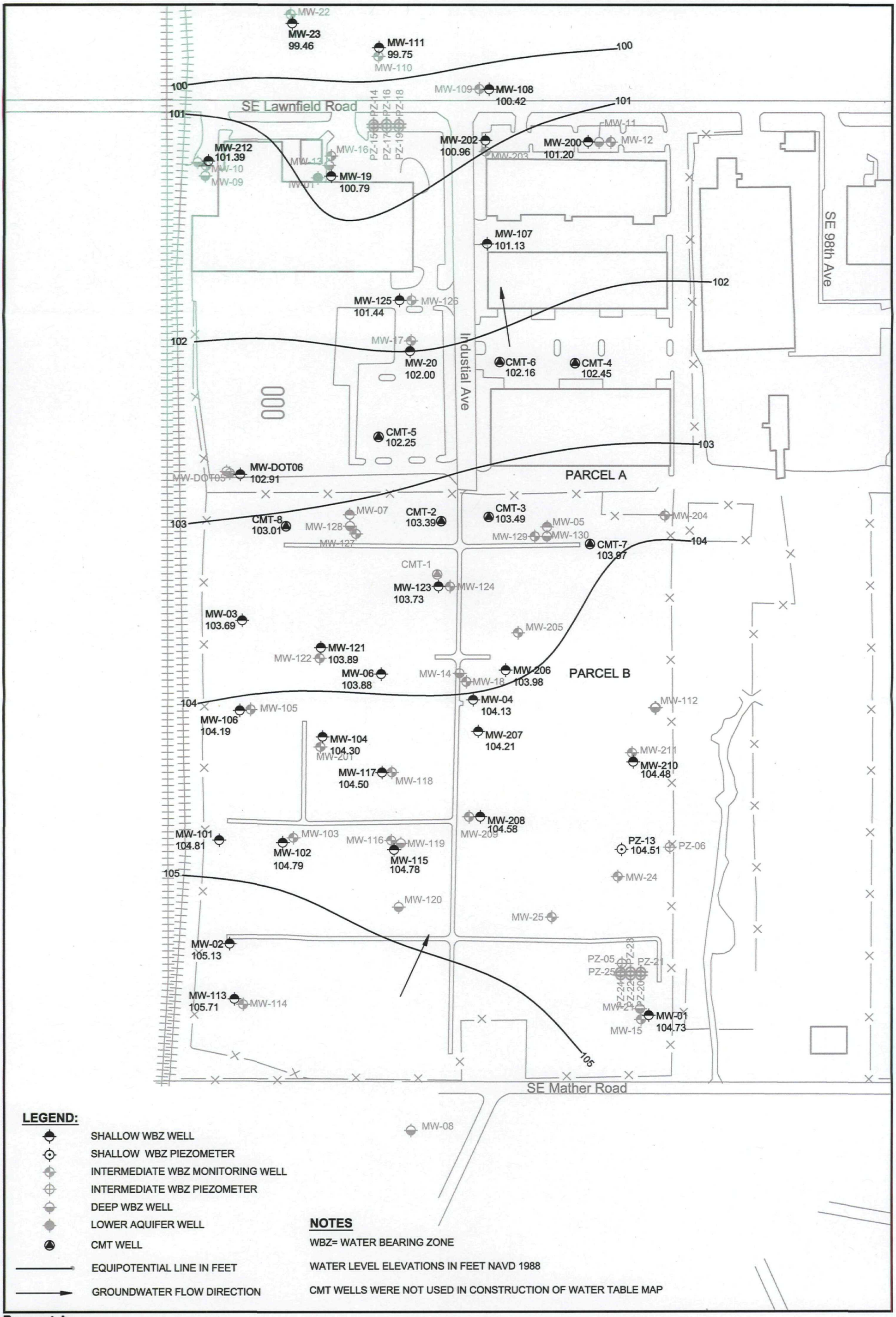
1000 Benzo(a)pyrene

27000 Naphthalene

554 PCE

Figure 6-2
Coal Tar Body 2
Location Map and
Cross Section

Second Five Year Review Report
Northwest Pipe and Casing
Clackamas, Oregon



LEGEND:

- SHALLOW WBZ WELL
- SHALLOW WBZ PIEZOMETER
- INTERMEDIATE WBZ MONITORING WELL
- INTERMEDIATE WBZ PIEZOMETER
- DEEP WBZ WELL
- LOWER AQUIFER WELL
- CMT WELL
- EQUIPOTENTIAL LINE IN FEET
- GROUNDWATER FLOW DIRECTION

NOTES

WBZ= WATER BEARING ZONE

WATER LEVEL ELEVATIONS IN FEET NAVD 1988

CMT WELLS WERE NOT USED IN CONSTRUCTION OF WATER TABLE MAP

Parametrix DATE: Mar 26, 2010 FILE: PO2328007CF-106

N

0 200'

SCALE IN FEET

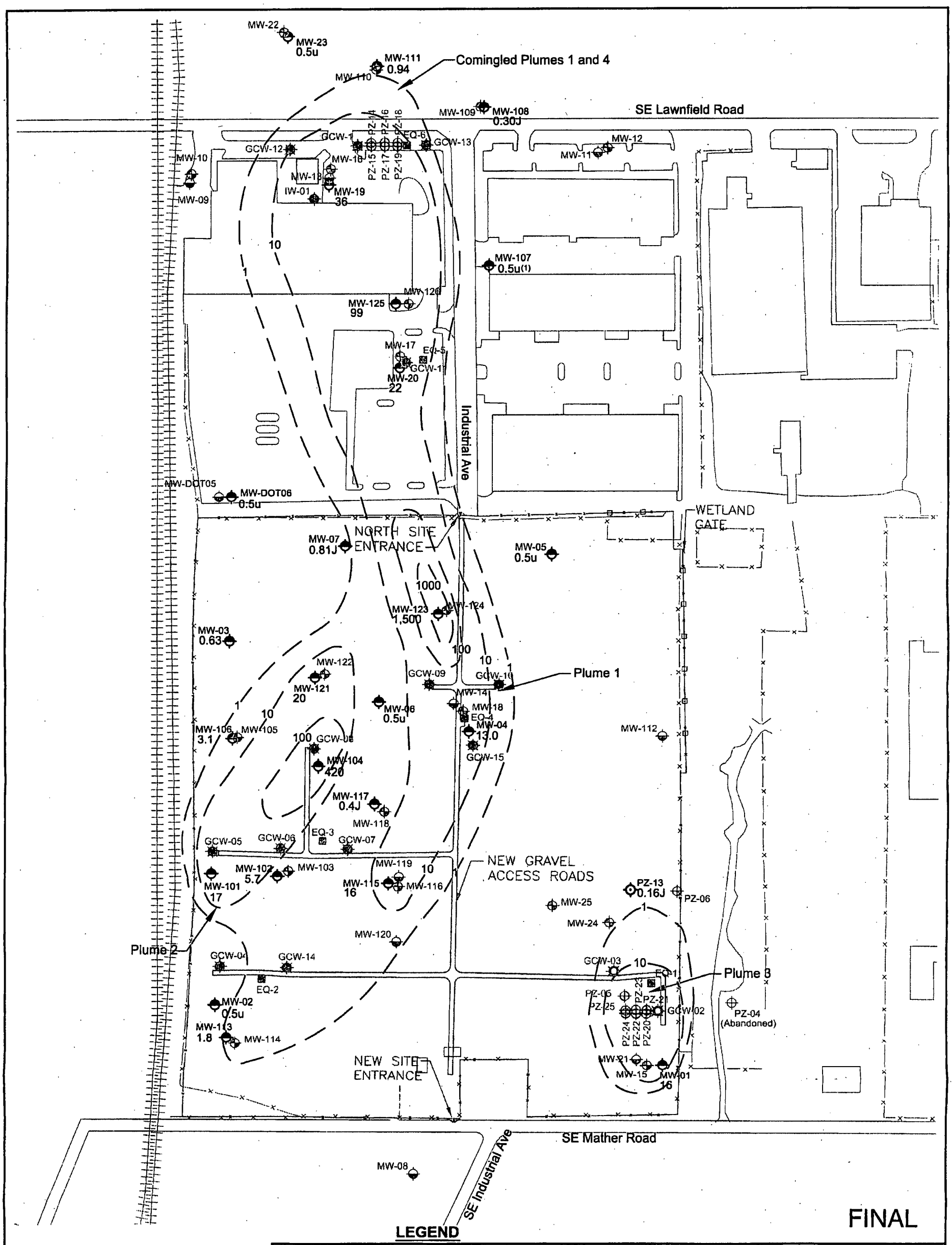
Figure 6-3
Water Level Elevation Contour Map
November 2008
Shallow WBZ

Second Five Year Review Report
Northwest Pipe and Casing

Parametrix Date: April 12, 2011 File: Fig 6-4 NW_Pipe_2010_MonitoringReport.mxd

Figure 6-4
Water Level Elevation Contour Map
November 2010
Shallow WBZ

Second Five Year Review Report
Northwest Pipe and Casing
Clackamas, Oregon



REFERENCE: Figure from URS. Technical Memorandum – Baseline Groundwater Monitoring, Groundwater Circulation Well Performance Testing & Monitoring, and Vapor Treatment System Monitoring. Prepared for U.S. Environmental Protection Agency. April 2004.

NOTE: Figure not to scale.

Figure 6-5
PCE Plume Boundaries
Shallow WBZ, 2003

Second Five Year Review Report
Northwest Pipe and Casing
Clackamas, Oregon

DATE: April 12, 2011 FILE: Fig 6-6 NW_Pipe_Casing_Isoconcentrations.mxd

Note: Remedial Goal for PCE is 1.0 µg/L

Figure 6-6
PCE Isoconcentration Map
November 2010
Shallow WBZ

Second Five Year Review Report
Northwest Pipe and Casing
Clackamas, Oregon

DATE: April 12, 2011 FILE: Fig 6-7 NW_Pipe_Casing_Isoconcentrations.mxd

Figure 6-7
PCE Isoconcentration Map
November 2010
Intermediate WBZ

Second Five Year Review Report
Northwest Pipe and Casing
Clackamas, Oregon

DATE: April 12, 2011 FILE: Fig 6-8 NW_Pipe_Casing_Isoconcentrations.mxd

Figure 6-8
PCE Isoconcentration Map
November 2010
Deep WBZ

Second Five Year Review Report
Northwest Pipe and Casing
Clackamas, Oregon

Parametrix Date: April 12, 2011 File: Fig 6-7 NW_Pipe_Casing_Report.mxd

N

0 100 200 300

Scale in Feet

- Boring
- CMT Well
- Shallow Piezometer
- Shallow WBZ Well
- Isoconcentration Line µg/L

Figure 6-9
Naphthalene Isoconcentration Map
November 2008
Shallow WBZ

Second Five Year Review Report
Northwest Pipe and Casing
Clackamas, Oregon

Figure 6-10
Naphthalene Isoconcentration Map
November 2008
Intermediate WBZ

Second Five Year Review Report
Northwest Pipe and Casing
Clackamas, Oregon

Figure 6-11
Naphthalene Isoconcentration Map
November 2008
Deep WBZ

Second Five Year Review Report
Northwest Pipe and Casing
Clackamas, Oregon

APPENDIX A

Community Involvement

EPA
United States
Environmental Protection
Agency

Northwest Pipe and Casing Superfund Site
Five Year Review
Clackamas, Oregon - April 2011

The EPA is doing the second Five-Year Review of the Northwest Pipe and Casing Superfund Site in Clackamas, Oregon. This review provides a routine check-up to make sure that the cleanup conducted between 1993 and 2001 continues to protect people and the environment. The cleanup included excavation and disposal of contaminated soil and debris and treatment of contaminated groundwater.

The Northwest Pipe and Casing/Hall Process Company conducted pipe manufacturing and coating operations at the site from 1956 to 1985. Waste from operations contaminated the soil and groundwater with solvents, primers, coal tar, coal-tar residues, polychlorinated biphenyls (PCBs), and oils.

The review will be completed by June 11, 2011. If you have information that may help us with the review, or have questions about the site, please contact Mark Ader, EPA Project Manager, at 206-553-1849 or ader.mark@epa.gov. Site information is available at: View the ESD at: http://yosemite.epa.gov/R10/CLEANUP.NSF/sites/NWpipe

APPENDIX B

Documents Reviewed

Indoor Air Sampling

EPA 2007. Indoor Air Sampling and Quality Assurance Project Plan, Northwest Pipe and Casing Site, Clackamas, Oregon. Prepared by U.S. Environmental Protection Agency, Region 10 and Emergency Response Team, Las Vegas, NV. September 5, 2007.

EPA 2008. Memorandum: Northwest Pipe and Casing Vapor Intrusion Study and Risk Analysis. Prepared by U.S. Environmental Protection Agency, Region 10 and Emergency Response Team, Las Vegas, NV. October 21, 2008.

Technical Memos on Remedy

GeoTrans 2007. Report of the Remediation System Evaluation Site Visit Conducted at the Northwest Pipe and Casing Site May 9, 2007. Prepared for U.S. Environmental Protection Agency. September 27, 2007.

Parametrix 2006. Technical Memorandum No. 1: Data Needs for GCW Evaluation, Northwest Pipe and Casing/ Hall Process Company Superfund Site, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency. June 30, 2006.

Parametrix 2006. Technical Memorandum No. 2a Short-term O&M Strategy, Northwest Pipe and Casing/ Hall Process Company Superfund Site, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency. June 30, 2006.

Parametrix 2006. GCW-08 Performance Evaluation, Northwest Pipe and Casing/ Hall Process Company Superfund Site, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency. July 25, 2006.

Parametrix 2006. Technical Memorandum No. 3 Recommendations for Continued Remedial Action Northwest Pipe and Casing/ Hall Process Company Superfund Site, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency. September 25, 2006.

Parametrix 2006. Five Year Review Report, Northwest Pipe and Casing, ORD 980988307, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency. October 2, 2006.

Parametrix 2006. Technical Memorandum No. 2b Supplemental Data Determinations, Northwest Pipe and Casing/ Hall Process Company Superfund Site, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency. October 13, 2006.

QAPPs

Parametrix 2006. QAPP Addendum for Reduced GCW Influent and Effluent Sampling, Northwest Pipe and Casing/ Hall Process Company Superfund Site, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency, Seattle, WA. September 8, 2006.

Parametrix 2007. QAPP Addendum for 2007 Site Wide Groundwater Monitoring, Northwest Pipe and Casing/ Hall Process Company Superfund Site, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency, Seattle, WA. October 29, 2007.

Parametrix 2008. QAPP Addendum for 2008 Limited Groundwater Monitoring, Northwest Pipe and Casing/ Hall Process Company Superfund Site, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency, Seattle, WA. February 14, 2008.

Groundwater Monitoring Reports

Parametrix 2007. Final Sitewide Groundwater Monitoring Report – November 2006, Northwest Pipe and Casing Site, Operable Unit 2 - Groundwater. Prepared for U.S. Environmental Protection Agency, Seattle, WA. March 13, 2007.

Parametrix 2008. Draft - Sitewide Groundwater Monitoring Report – November 2007, Northwest Pipe and Casing Site, Operable Unit 2 - Groundwater. Prepared for U.S. Environmental Protection Agency, Seattle, WA. March 24, 2008.

Parametrix 2008. Supplemental Groundwater Sampling Report – February 2008, Northwest Pipe and Casing/ Hall Process Company Superfund Site, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency, Seattle, WA. March 26, 2008.

Parametrix 2008. Sitewide Groundwater Monitoring Report, Northwest Pipe and Casing, November 2007 through June 2008. Prepared for U.S. Environmental Protection Agency, Seattle, WA. July 28, 2008.

Parametrix 2010. Summary of the November 2008 Groundwater Sampling Event Technical Memorandum, Northwest Pipe and Casing/ Hall Process Company Superfund Site, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency, Seattle, WA. March 25, 2010.

Parametrix 2010. Summary of Groundwater Monitoring Results for the November 2009 Limited Groundwater Sampling Event, Northwest Pipe and Casing/ Hall Process Company Superfund Site, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency, Seattle, WA. May 12, 2010.

Parametrix 2010. Summary of Groundwater Monitoring Results for the July 2010 Limited Groundwater Sampling Event, Northwest Pipe and Casing/ Hall Process Company Superfund Site, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency, Seattle, WA. November 18, 2010.

Parametrix 2011. 2010 Site Wide Monitoring Report, Northwest Pipe and Casing, Clackamas, Oregon. Prepared for the U.S. Environmental Protection Agency, Seattle, WA. March 2011.

FFI

Parametrix 2009. Focused Field Investigation, Fall 2008, Northwest Pipe and Casing/ Hall Process Company Superfund Site, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency, Seattle, WA. February 23, 2009.

O&M of Treatment System

Parametrix 2006. September 2006 Evaluation of On-Site Treatment Systems, Northwest Pipe and Casing/ Hall Process Company Superfund Site, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency, Seattle, WA. October 16, 2007.

Parametrix 2006. October 2006 Evaluation of On-Site Treatment Systems, Northwest Pipe and Casing/ Hall Process Company Superfund Site, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency, Seattle, WA. November 10, 2007.

Parametrix 2006. November 2006 Evaluation of On-Site Treatment Systems, Northwest Pipe and Casing/ Hall Process Company Superfund Site, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency, Seattle, WA. December 15, 2007.

Parametrix 2006. December 2006 Evaluation of On-Site Treatment Systems, Northwest Pipe and Casing/ Hall Process Company Superfund Site, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency, Seattle, WA. January 9, 2007.

Parametrix 2007. January 2007 Evaluation of On-Site Treatment Systems, Northwest Pipe and Casing/ Hall Process Company Superfund Site, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency, Seattle, WA. February 18, 2007.

Parametrix 2007. February 2007 Evaluation of On-Site Treatment Systems, Northwest Pipe and Casing/ Hall Process Company Superfund Site, Clackamas, Oregon. Prepared for U.S. Environmental Protection Agency, Seattle, WA. March 12, 2007.

Land Use

DEQ and CCDA. 2005. Easement and Equitable Servitude. October 6, 2005.

DEQ and EPA. 2005. Soil Cap Monitoring and Maintenance Plan. August 31, 2005.

DEQ and NWDC. 2010. Easement and Equitable Servitude. September 30, 2010.

DEQ and ODOT. 2009. Easement and Equitable Servitude. August 19, 2009.

EPA 2008. Letter to Charles Schwarz, Oregon Department of Transportation form Mark Ader. RE: Finalize Easement and Equitable Servitude Agreement for Lawnfield Maintenance Facility, Clackamas, Oregon. Prepared by U.S. Environmental Protection Agency, Region 10, Seattle, WA. February 13, 2008.

EPA. 2005. Waste Management Plan, Northwest Pipe and Casing / Hall Process Company, Clackamas County, Oregon.

EPA 2009. Letter to Peter Stroud, Kleinfelder from Mark Ader, EPA. RE: Response to Sunrise Corridor FEIS. Prepared by U.S. Environmental Protection Agency, Region 10, Seattle, WA. February 13, 2008.

EPA 2010. Letter to Ken Itel, Clackamas County Development Agency form Mark Ader, EPA. RE: Northwest Pipe and Casing/ Hall Processing Company Superfund Site (NWPC Site) Clackamas

County Development Agency and Its Lessee Oregon Iron Works, Street Car Test Track Development and Construction Issues.

EPA 2010. Letter to Barbra Cartmill, Clackamas County Development Agency from Mark Ader, EPA. RE: Response Redevelopment and Construction Issues. Prepared by U.S. Environmental Protection Agency, Region 10, Seattle, WA. March 9, 2010.

Harper et al 2010. Harper Houf Peterson Righellis, Inc. Proposed Grading Site Plan, Oregon Iron Works Phase II. February 11, 2010.

URS. 2003. Wetland Mitigation and Monitoring/Maintenance Plan. Prepared for US Environmental Protection Agency. July 2003.

Removal Action

EPA 2009. Approval and Funding of a Time Critical Removal Action ant the Northwest Pipe and Casing / Hall Processing Company Site (NWPC Site) and Request for a 2 Million Dollar Exemption. Prepared by U.S. Environmental Protection Agency, Region 10 Emergency Response Unit. July 28, 2009.

EPA. 2011. Draft Removal Action Report for Northwest Pipe and Casing, Clackamas, Oregon. May 2011.

Background

DEQ. 1987. Preliminary Assessment, Northwest Pipe and Casing. September 1987.

DEQ 2009. Risk Based Concentrations for Individual Chemicals. Oregon Department of Environmental Quality, Land Quality Division. September 15, 2009.

DEQ 2009. Interim TCE Toxicity Values used in DEQ's RBC spreadsheet. Prepared by the Oregon Department of Environmental Quality. September 15, 2009.

E&E. 1988. Site Inspection Report, Northwest Pipe and Casing, Clackamas, Oregon. Prepared for US Environmental Protection Agency by Earth and Environmental. December 2, 1988.

E&E. 1990. Listing Site Inspection Report, Northwest Pipe and Casing, Clackamas, Oregon. Prepared for US Environmental Protection Agency by Earth and Environmental. June 14, 1990.

E&E. 1993. Site Assessment, Northwest Pipe and Casing, Clackamas, Oregon. Prepared for US Environmental Protection Agency by Earth and Environmental. July 2, 1993.

EPA. 2000. Record of Decision, Operable Unit 1, Northwest Pipe and Casing. June 2000.

EPA. 2001. Record of Decision Operable Unit 2, Northwest Pipe and Casing. September 2001.

EPA. 2004. Explanation of Significant Differences – Operable Unit 1, Northwest Pipe and Casing / Hall Process Company, Clackamas County Oregon. March 23, 2004.

EPA. 2005. Waste Management Plan, Northwest Pipe and Casing / Hall Process Company, Clackamas County, Oregon.

EPA. 2008. Explanation of Significant Differences – Operable Unit 2, Northwest Pipe and Casing / Hall Process Company, Clackamas County Oregon. December 18, 2008.

URS / CH2M Hill. 1999. Final Feasibility Study, Northwest Pipe and Casing / Hall Process Company. Prepared for the US Environmental Protection Agency by URS Greiner in association with CH2M Hill. August 1999.

URS Corporation. 2002. Interim Remedial Action Report, Northwest Pipe and Casing / Hall Process Company Superfund Site Operable Unit 1. Prepared for US Environmental Protection Agency. March 2002.

URS. 2002. Addendum #1 to the Interim Remedial Action Report, Northwest Pipe and Casing / Hall Process Company Superfund Site Soil Operable Unit (OU 1). Prepared for US Environmental Protection Agency. June 2002.

URS. 2003. Final Basis of Design Report. Northwest Pipe and Casing / Hall Process Company Soil Cap Remedial Design. Prepared for US Environmental Protection Agency. March 2003.

URS. 2004. Final Technical Memorandum, Baseline Groundwater Monitoring, Groundwater Circulation Well Performance Testing & Monitoring, and Vapor Treatment System Monitoring, Northwest Pipe and Casing Groundwater Operable Unit 2 Remedial Action. Prepared for US Environmental Protection Agency. April 2004.

Weston. 1998. Remedial Investigation Report, Northwest Pipe and Casing / Hall Process Company. Prepared for US Environmental Protection Agency. August 1998.

Weston. 1998. Human Health Risk Assessment Technical Memorandum – Contaminants of Concern/Exposure Assessment, Northwest Pipe and Casing. Prepared for US Environmental Protection Agency. January 27 1998.

Soil Cap

Clackamas County. 2005. Soil Cap Inspection Report Form. October 31, 2005.

GeoDesign. 2005. Soil Cap Inspection Report Form. December 21, 2005.

GeoDesign. 2006. Soil Cap Inspection Report Form. March 27, 2006.

GeoDesign. 2006. Soil Cap Inspection Report Form. June 27, 2006.

GeoDesign. 2006. Soil Cap Inspection Report Form. September 27, 2006.

GeoDesign. 2006. Soil Cap Inspection Report Form. December 21, 2006.

GeoDesign. 2007. Soil Cap Inspection Report Form. January 30, 2007.

GeoDesign. 2007. Soil Cap Inspection Report Form. July 24, 2007.

GeoDesign. 2008. Soil Cap Inspection Report Form. January 28, 2008.

GeoDesign. 2008. Soil Cap Inspection Report Form. July 28, 2008.

GeoDesign. 2009. Soil Cap Inspection Report Form. January 23, 2009.

GeoDesign. 2009. Soil Cap Inspection Report Form. July 27, 2009.

GeoDesign. 2010. Soil Cap Inspection Report Form. February 24, 2010.

GeoDesign. 2010. Soil Cap Inspection Report Form. July 19, 2010.

GeoDesign. 2011. Soil Cap Inspection Report Form. January 25, 2011.

Wetland

GeoEngineers. 2008. Wetland Monitoring Report for Monitoring Year 5 of 5 (2008), Northwest Pipe and Casing, Operable Unite 1 – Soil Cap Remedial Action, Clackamas, Oregon. Prepared for ODEQ. August 21, 2008.

Risk Assessment

EPA. 2011. Draft Updated Human Health Risk Assessment, Northwest Pipe and Casing Site. May 2011.

APPENDIX C

Site Inspection Checklist

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: NORTHWEST PIPE AND CASING / HALL PROCESS COMPANY	**Date of inspection:** 3/24/11
Location and Region: CLACKAMAS, OR / REGION 10	**EPA ID:** ORD 980988327
Agency, office, or company leading the five-year review: PARAMETRIX, PORTLAND, OR	**Weather/temperature:** ~ 45°F / SHOWERS

Remedy Includes: (Check all that apply)

- ✓ Landfill cover/containment
- ✓ Access controls
- ✓ Institutional controls
- ✓ Groundwater pump and treatment
- Surface water collection and treatment
- Other Soil Hotspot Removal, treatment/disposal offsite
- Monitored natural attenuation
- ✓ Groundwater containment
- Vertical barrier walls

Attachments: Inspection team roster attached Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** N/A _____ _____ _____
   Name Title Date
   Interviewed at site at office by phone Phone no. _____
   Problems, suggestions; Report attached _____

2. **O&M staff** N/A _____ _____ _____
   Name Title Date
   Interviewed at site at office by phone Phone no. _____
   Problems, suggestions; Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY
Contact DEBORAH BAILEY Project Manager 3/31/11 (b) (6)
Name Title Date Phone no.
Problems; suggestions; Report attached _____

Agency _____
Contact _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____

Agency _____
Contact _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____

Agency _____
Contact _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____

4. **Other interviews** (optional) Report attached. APPENDIX D

KEN ITEL - Clackamas County Development Agency
MARK LaNOUE - LaNoue Development
BRIAN McNAMARA - ODOT
Bobby Walker - ODOT
Mike Strauch - ODOT
TARA ARANIO - Oregon Iron Works

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - O&M manual — Readily available — Up to date — N/A
   - As-built drawings — Readily available — Up to date — N/A
   - Maintenance logs — Readily available — Up to date — N/A

   Remarks

2. **Site-Specific Health and Safety Plan** — Readily available — Up to date — N/A
   - Contingency plan/emergency response plan — Readily available — Up to date — N/A

   Remarks

3. **O&M and OSHA Training Records** — Readily available — Up to date — N/A

   Remarks

4. **Permits and Service Agreements**
   - Air discharge permit — Readily available — Up to date — N/A
   - Effluent discharge — Readily available — Up to date — N/A
   - Waste disposal, POTW — Readily available — Up to date — N/A
   - Other permits _____ — Readily available — Up to date — N/A

   Remarks

5. **Gas Generation Records** — Readily available — Up to date — N/A

   Remarks

6. **Settlement Monument Records** — Readily available — Up to date — N/A

   Remarks

7. **Groundwater Monitoring Records** — Readily available — Up to date — N/A

   Remarks

8. **Leachate Extraction Records** — Readily available — Up to date — N/A

   Remarks

9. **Discharge Compliance Records**
   - Air — Readily available — Up to date — N/A
   - Water (effluent) — Readily available — Up to date — N/A

   Remarks

10. **Daily Access/Security Logs** — Readily available — Up to date — N/A

    Remarks

IV. O&M COSTS N/A

1. **O&M Organization**
   State in-house — Contractor for State
   PRP in-house — Contractor for PRP
   Federal Facility in-house — Contractor for Federal Facility
   Other_____

2. **O&M Cost Records**
   Readily available — Up to date
   Funding mechanism/agreement in place
   Original O&M cost estimate_____ Breakdown attached

   Total annual cost by year for review period if available

   From_____ To_____ _____ Breakdown attached
   Date — Date — Total cost

   From_____ To_____ _____ Breakdown attached
   Date — Date — Total cost

   From_____ To_____ _____ Breakdown attached
   Date — Date — Total cost

   From_____ To_____ _____ Breakdown attached
   Date — Date — Total cost

   From_____ To_____ _____ Breakdown attached
   Date — Date — Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS (Applicable) N/A

A. Fencing

1. **Fencing damaged** — Location shown on site map — (Gates secured) — N/A
   Remarks_____

B. Other Access Restrictions

1. **Signs and other security measures** — Location shown on site map — N/A
   Remarks WARNING SIGNS IN PLACE

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented — Yes (No) N/A
Site conditions imply ICs not being fully enforced — Yes (No) N/A

Type of monitoring (*e.g.*, self-reporting, drive by) SELF REPORTING
Frequency _____
Responsible party/agency ODOT / CCDA / NW Development
Contact _____

Name	Title	Date	Phone no.

Reporting is up-to-date — Yes No (N/A)
Reports are verified by the lead agency — Yes No (N/A)

Specific requirements in deed or decision documents have been met — (Yes) No N/A
Violations have been reported — Yes (No) N/A
Other problems or suggestions: Report attached

ODOT - Bobby Walker 971-673-6200
CCDA - Ken Itel 503-742-4324
NW Dev - Mark LaNoue 503-464-4055

2. **Adequacy** (ICs are adequate) ICs are inadequate N/A
Remarks _____

D. General

1. **Vandalism/trespassing** Location shown on site map (No vandalism evident)
Remarks _____

2. **Land use changes on site** N/A
Remarks OIW development of Parcel B - laydown YARD and Streetcar TEST TRACK

3. **Land use changes off site** (N/A)
Remarks _____

VI. GENERAL SITE CONDITIONS

A. Roads (Applicable) N/A

1. **Roads damaged** Location shown on site map (Roads adequate) N/A
Remarks _____

B. Other Site Conditions

Remarks_____

VII. LANDFILL COVERS (Applicable) N/A

A. Landfill Surface Soil Cap

1. **Settlement** (Low spots) Location shown on site map (Settlement not evident)
   Areal extent_____ Depth_____
   Remarks_____

2. **Cracks** Location shown on site map (Cracking not evident)
   Lengths_____ Widths_____ Depths_____
   Remarks_____

3. **Erosion** Location shown on site map (Erosion not evident)
   Areal extent_____ Depth_____
   Remarks_____

4. **Holes** Location shown on site map (Holes not evident)
   Areal extent_____ Depth_____
   Remarks_____

5. **Vegetative Cover** (Grass) (Cover properly established) No signs of stress
   Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____

6. **Alternative Cover (armored rock, concrete, etc.)** (N/A)
   Remarks_____

7. **Bulges** Location shown on site map (Bulges not evident)
   Areal extent_____ Height_____
   Remarks_____

8. **Wet Areas/Water Damage** — Wet areas/water damage not evident
   - Wet areas — Location shown on site map — Areal extent____
   - Ponding — Location shown on site map — Areal extent VARIABLE
   - Seeps — Location shown on site map — Areal extent____
   - Soft subgrade — Location shown on site map — Areal extent____

   Remarks____

9. **Slope Instability** — Slides — Location shown on site map — No evidence of slope instability
   Areal extent____
   Remarks____

B. Benches — Applicable — N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** — Location shown on site map — N/A or okay
   Remarks____

2. **Bench Breached** — Location shown on site map — N/A or okay
   Remarks____

3. **Bench Overtopped** — Location shown on site map — N/A or okay
   Remarks____

C. Letdown Channels — Applicable — N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** — Location shown on site map — No evidence of settlement
   Areal extent____ Depth____
   Remarks____

2. **Material Degradation** — Location shown on site map — No evidence of degradation
   Material type____ Areal extent____
   Remarks____

3. **Erosion** — Location shown on site map — No evidence of erosion
   Areal extent____ Depth____
   Remarks____

4. **Undercutting** Location shown on site map No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ No obstructions
Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
No evidence of excessive growth
Vegetation in channels does not obstruct flow
Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations Applicable N/A

1. **Gas Vents** Active Passive
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance
N/A
Remarks_____

2. **Gas Monitoring Probes**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks Older well monuments do not secure - some hold rainwater

4. **Leachate Extraction Wells**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

5. **Settlement Monuments** Located Routinely surveyed N/A
Remarks_____

E. Gas Collection and Treatment Applicable (N/A)

1. **Gas Treatment Facilities**
   Flaring Thermal destruction Collection for reuse
   Good condition Needs Maintenance
   Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
   Good condition Needs Maintenance
   Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   Good condition Needs Maintenance N/A
   Remarks_____

F. Cover Drainage Layer Applicable (N/A)

1. **Outlet Pipes Inspected** Functioning N/A
   Remarks_____

2. **Outlet Rock Inspected** Functioning N/A
   Remarks_____

G. Detention/Sedimentation Ponds Applicable (N/A)

1. **Siltation** Areal extent_____ Depth_____ N/A
   Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   Erosion not evident
   Remarks_____

3. **Outlet Works** Functioning N/A
   Remarks_____

4. **Dam** Functioning N/A
   Remarks_____

H. Retaining Walls Applicable (N/A)

1. **Deformations** Location shown on site map Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** Location shown on site map Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge (Applicable) N/A

1. **Siltation** Location shown on site map Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** Location shown on site map N/A
   (Vegetation does not impede flow)
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** Location shown on site map (Erosion not evident)
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** (Functioning) N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS Applicable (N/A)

1. **Settlement** Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   Performance not monitored
   Frequency_____ Evidence of breaching
   Head differential_____
   Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES Applicable N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines Applicable N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   Good condition All required wells properly operating Needs Maintenance N/A
   Remarks GCWs ARE NOT OPERATIONAL - SOME VAULTS CONTAIN STORMWATER WHICH MAY AFFECT IN-VAULT EQUIPMENT

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Good condition Needs Maintenance
   Remarks

3. **Spare Parts and Equipment**
   Readily available Good condition Requires upgrade Needs to be provided
   Remarks

B. Surface Water Collection Structures, Pumps, and Pipelines Applicable N/A

1. **Collection Structures, Pumps, and Electrical**
   Good condition Needs Maintenance
   Remarks

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Good condition Needs Maintenance
   Remarks

3. **Spare Parts and Equipment**
   Readily available Good condition Requires upgrade Needs to be provided
   Remarks

C. Treatment System Applicable N/A

1. **Treatment Train** (Check components that apply)
   Metals removal Oil/water separation Bioremediation
   Air stripping Carbon adsorbers - Zone
   Filters
   Additive (*e.g.*, chelation agent, flocculent)
   Others
   Good condition Needs Maintenance
   Sampling ports properly marked and functional
   Sampling/maintenance log displayed and up to date
   Equipment properly identified
   Quantity of groundwater treated annually
   Quantity of surface water treated annually
   Remarks GCW SYSTEMS CURRENTLY INOPERATIONAL

2. **Electrical Enclosures and Panels** (properly rated and functional)
   N/A Good condition Needs Maintenance
   Remarks

3. **Tanks, Vaults, Storage Vessels**
   N/A Good condition Proper secondary containment Needs Maintenance
   Remarks

4. **Discharge Structure and Appurtenances**
   N/A Good condition Needs Maintenance
   Remarks

5. **Treatment Building(s)**
   N/A Good condition (esp. roof and doorways) Needs repair
   Chemicals and equipment properly stored
   Remarks

6. **Monitoring Wells** (pump and treatment remedy)
   Properly secured/locked Functioning Routinely sampled Good condition
   All required wells located Needs Maintenance N/A
   Remarks SOME OLDER WELL MONUMENTS DO NOT SECURE

D. Monitoring Data

1. Monitoring Data
   Is routinely submitted on time Is of acceptable quality

2. Monitoring data suggests: - SEE SECTION 6.5 of 5YR REVIEW
   Groundwater plume is effectively contained Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
   Properly secured/locked Functioning Routinely sampled Good condition
   All required wells located Needs Maintenance N/A
   Remarks SEE C6.

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

OU1 REMEDY - LIMITING EXPOSURE TO ON SITE CONTAMINANTS - IS currently properly maintained and protective

OU2 REMEDY - IN SITU TREATMENT of Groundwater via CrCW Systems - THIS PORTION of OU2 Remedy has failed - ICs currently provide short term protection from exposure to groundwater. Exposure pathways are incomplete.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

No CURRENT O&M on site

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

- No early indicators observed.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

- No optimization actions for OU1 or OU2 remedies are recommended.

APPENDIX D

Interviews

Interviewee

Ken Itel, Senior Property Planner, Clackamas County Development Agency, 150 Beaver Creek Road, Oregon City, Oregon, 97045, kennethite@co.clackamas.or.us, 503-742-4324

Summary of role and responsibilities

Ken is the property development manager for Clackamas County. The county purchased Parcel B on October 7, 2005. Ken is the county's liaison with EPA, DEQ, and ODOT. Ken is responsible for the parcel being mowed, fences are secured, and the soil cap and wetlands being maintained. Ken is also responsible for proper development of the property by their lessee Oregon Iron Works (OIW). Ken has worked with OIW on acquiring land use permits, building permits, and 1200C stormwater permits.

Date of Interview – 3/31/11

1. *Have EPA and its contractors kept you informed and have they supplied appropriate levels of information regarding site activities?*

   "Yes, I believe EPA has kept me well informed regarding remedial activities. I would like the contractor to inform me when they are on-site."

2. *Are there any duties EPA and/or contractor have not fulfilled?*

   "Off the top of my head EPA has fulfilled their duties."

3. *Do the remedial actions coincide with the objectives of the County?*

   "Yes. We have a common objective of cleaning the site up as much as possible overtime, stop off-site contamination, and reduce on-site contamination."

4. *Do you have any concerns regarding the site?*

   "No particular concerns, avoid further off-site contamination."

5. *Are there any new developments, either constructed or planned in the area that the agency is unaware about? Construction permits pending or submitted?*

   "OIW intends to lease the northwest corner of Parcel B after the Sunrise Corridor is completed, with no intent to build in this area. No improvements are anticipated with regards to OIW. The county may be responsible for constructing and maintaining a new surface street named Industrial Way. The street is needed for local access due to modifications of Lawnfield and Mather Roads from the Sunrise Corridor. This would parallel the parcel's western boundary line."

   Ken indicated that he has had limited communication with ODOT on the Sunrise Corridor Project and the proposed Industrial Way, but would inform Mark Ader regarding any developments. Both Ken and Mark are aware that the milestone for 90 percent design is 12/12/12, with project construction beginning in 2013.

6. *What follow-up actions should be taken?*

   "None that I can think of at this point."

Interviewee

Mark La Noue, Managing Member, La Noue Development, L.L.C., 227 SW Pine Street, Portland, Oregon, 97204, mlanoue@northwest.com, 503-464-4055.

Summary of role and responsibilities

Mark La Noue and Earl Downs are the owners in trust of Northwest Development Corporation. The company owns a piece of property located on the east side of Parcel A that was formerly a pipe storage area for Northwest Pipe and Casing. Mark is responsible for management of the property.

Date of Interview – 4/27/11

1. *Have EPA and its contractors kept you informed and have they supplied appropriate levels of information regarding site activities?*

   "Yes and yes, to the best of my knowledge."

2. *Are there any duties EPA and/or contractor have not fulfilled?*

   "None to the best of my knowledge."

3. *Do the remedial actions coincide with your objectives?*

   "Yes, I believe they do. I want significant environmental impacts reduced, and am concerned with groundwater on my parcel.

4. *Do you have any concerns regarding the site?*

   I am concerned about the future development of Parcel B, and how it will affect the business park.

5. *Are there any new developments, either constructed or planned in the area that EPA is unaware about?*

   No new development is planned on our property.

6. *What follow-up actions should be taken?*

   No follow-up actions need to be taken.

Interviewee

Deborah Bailey, Project Manager, Oregon Department of Environmental Quality, 2020 SW 4th Avenue, Portland, Oregon, 97201, deborah.bailey@deq.state.or.us, 503-229-6811.

Summary of role and responsibilities

Deborah Bailey is the site project manager. Her responsibilities include technical and administrative duties regarding remedial actions for operable units OU1 (soil cap) and OU2 (groundwater). The State will take over O&M responsibilities for OU2 at a future date.

Date of Interview – 3/31/11

1. *Have EPA and its contractors kept you informed and have they supplied appropriate levels of information regarding site activities?*

   "Yes, definitely.

2. *Are there any duties EPA and/or contractor have not fulfilled?*

   "None to my knowledge."

3. *Do the remedial actions coincide with the objectives of the State?*

   "In general yes, however remedial actions at the site are in a state transition and need to be redefined through a ROD Amendment or equivalent. During this process the State and EPA will formally concur on defined objectives."

4. *Do you have any concerns regarding the site?*

   "The state has moderate concerns regarding finalizing the joint State-EPA superfund contract; the potential for losing a portion of the monitoring well network from the proposed construction of the Sunrise Corridor; and demonstrating that monitored natural attenuation (MNA) is a viable component of the groundwater remedy."

5. *Are there any new developments, either constructed or planned in the area that EPA is unaware about?*

   "None at this time."

6. *What follow-up actions should be taken?*

   "Actions to be considered are, predictive MNA modeling to help determine acceptable concentrations of residual contaminants in groundwater that can be passively remediated; and potentially expanding groundwater monitoring in the deep water bearing zone."

Interviewee

Brian McNamara, Geo-Hydro Hazmat, Oregon Department of Transportation Region 1, 123 NW Flanders, Portland, Oregon, 97209, 503-731-3186.

Summary of role and responsibilities

Brian is responsible for overseeing environmental issues at the ODOT Maintenance Facility and serves as a technical liaison with EPA and DEQ.

Date of Interview – 4/1/11

1. *Have EPA and its contractors kept you informed and have they supplied appropriate levels of information regarding site activities?*

   "Yes, EPA has provided ODOT with relevant reports and information, which I have relayed to the maintenance staff at the facility."

2. *Are there any duties EPA and/or contractor have not fulfilled?*

   "No, not to my knowledge."

3. *Do the remedial actions coincide with the objectives of the State?*

   "Yes, ODOT feels that the cleanup is necessary for future site development."

4. *Do you have any concerns regarding the site?*

   "None at this time, but would like to be kept informed on contaminant migration and/or any new discovery of contamination."

5. *Are there any new developments, either constructed or planned in the area that EPA is unaware about?*

   "EPA is aware of the following new developments:

   - Geotechnical investigation will be conducted in the general footprint of the proposed corridor this summer. This will require EPA and DEQ's review and approval of an exploration work plan. ODOT recognizes that their work needs to be consistent with engineering and institutional controls pursuant the Consent Decree.
   - ODOT will prepare a development plan (DP) for the corridor. The plan is anticipated to require up to three rounds of EPA and DEQ review as engineering details are refined. In general the plan will identify the type and locations of utility lines, foundations, and other built structures that will disturb subsurface soil and/or groundwater; and will address environmental issues that include, but are not limited to, monitoring well decommissioning / replacement, soil cap maintenance and monitoring, stormwater, waste management, mitigating potential adverse effects from construction to the underlying Troutdale Aquifer". The first draft of the DP is anticipated for agency review in November of 2011.
   - ODOT is coordinating future effort with OIW."

6. *What follow-up actions should be taken?*

   "Request that Bobby Walker, ODOT Maintenance Facility Manager be interview as part of the five year review process.

Interviewee

Tara Aarnio, General Counsel, Oregon Iron Works Inc, 9700 SE Lawnfield Road, Clackamas, Oregon, 97015, 503-653-6300.

Summary of role and responsibilities

As general counsel for OIW, Tara is directly involved in the leased property's legal and environmental issues, permitting, and as well as site development.

Date of Interview – 4/5/11

1. *Have EPA and its contractors kept you informed and have they supplied appropriate levels of information regarding site activities?*

   "Yes, most definitely. Lines of communication have been clearly established allowing for safe work environments. The Contractor has contacted OIW prior to site visits."

2. *Are there any duties EPA and/or contractor have not fulfilled?*

   "Not that I am aware of."

3. *Do the remedial actions coincide with the objectives of the State?*

   "Yes, a cleaner site will allow OIW to expand in the future."

4. *Do you have any concerns regarding the site?*

   "Initial health and safety concerns have been alleviated. OIW does have concerns on how ODOT will develop the property, which may lead to unforeseen environmental issues popping up."

5. *Are there any new developments, either constructed or planned in the area that EPA is unaware about?*

   "OIW plans to lease the entire Parcel B once the Phase 1 of the Sunrise Corridor has been completed. An amendment to the lease has been submitted to the County. OIW plans to use the remaining space for storage or possibly a spur track to the Union Pacific line."

6. *What follow-up actions should be taken?*

   "None"

Interviewees

Bobby Walker, Assistant District Manager, ODOT Maintenance District 2b, 9200 SE Lawnfield Road Clackamas, OR 97015, 971-673-6200

Mike Strauch , District Manager, ODOT Maintenance District 2b, 9200 SE Lawnfield Road Clackamas, OR 97015, 971-673-6200

Summary of role and responsibilities

District manager and assistant district manager for ODOT Maintenance District 2b, responsibilities include management of maintenance, landscape and incident response.

Date of Interview – 4/26/11

1. *Have EPA and its contractors kept you informed and have they supplied appropriate levels of information regarding site activities?*

   "Yes, EPA contractors check in ahead of time and keep us informed of activities"

2. *Are there any duties EPA and/or contractor have not fulfilled?*

   "No"

3. *Do the remedial actions coincide with the objectives of the State?*

   "Yes"

4. *Do you have any concerns regarding the site?*

   "Employees have voiced concerns regarding the stigma of a Superfund site as well as concerns about the lack of further communications regarding indoor air quality results."

5. *Are there any new developments, either constructed or planned in the area that EPA is unaware about?*

   "No, EPA is aware of future Sunrise Corridor development and the fuel pump leak at the facility."

6. *What follow-up actions should be taken?*

   "None."